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Poultry sector study Bangladesh Revise 2023

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Poultry sector study Bangladesh

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Executive summary

Bangladesh (167 MN inhabitants) has been the fastest growing economy in Asia-Pacific in recent years. In 2018, the country reported a 7.9% growth in GDP and for the coming years (till 2025) an average GDP increase of 7% is foreseen. This growth has been consistently and is driven by increased consumption and infrastructure investments particularly. In 2018, Foreign Direct Investment grew with 13.3%. The Bangladesh Development Authority is working on policies to make investment in the country more attractive.

The country has the fastest growing increase in urbanization in Asia and cities host most of the Middle and Affluent Consumer (MAC) population, resulting in a strong concentration of disposable income. As a result of increasing disposable incomes, consumption of animal-based protein (poultry meat, eggs, beef, milk and fish) are expected to grow substantially for (at least) the next 10 years.

The poultry sector in Bangladesh is forecasted to follow this growth path as well. Per capita annual consumption levels for poultry meat and eggs are expected to increase with respectively 26% and 41% in the coming five years. Adding the estimated population growth (CARG 1.2%) to the expected consumption growth rates results in a total estimated poultry meat sector growth of 34% and 49% in the Bangladeshi layer sector.

Within the poultry sector, broiler chicken, with a current population of 525 MN birds, is the most produced and consumed variety. Sonali chicken is a local variety with a relatively high meat content and has been the fastest growing segment in recent years. The local Deshi chicken has the strongest consumer perception and hence is also the most expensive. The current egg production in Bangladesh is approximately 15.5 BN per year.

Compared to other markets in Asia-Pacific, the poultry sector in Bangladesh is relatively underdeveloped in virtually all steps of the value chain, though what stands out is the absence of a professional downstream segment (slaughtering, further processing and cold chain logistics infrastructure). Modern slaughtering (i.e. birds slaughtered in modern slaughterhouses) is limited to Dhaka and Chittagong (covering only 2-3% of all broilers consumed in Bangladesh), the remaining birds being slaughtered manually at wet markets. Wet markets are also the most important distribution channel for eggs, where over 90% (approximately 14 BN eggs annually) are being sold, the remaining via modern channels (retail, HORECA and food service).

Out of the 525 MN broilers annually consumed in Bangladesh, approximately 60% (300-325 MN) are reared in commercial farms, the remaining in semi-scavenging / traditional rural backyard conditions. In general, broiler farmers in Bangladesh still have a lot to gain in terms of technical performance, in terms of feed conversion, cycle length and mortality ratios amongst others.

Despite the poultry sector still being a relatively fragmented sector in Bangladesh (compared to other more developed economies), and involves a vast number of small-holders, there are also a number of larger (integrated) parties active in the business such as ACI-Godrej, Aftab, CP, New Hope, Nourish, Provita and Quality. These players are often active in multiple steps of the value chain, have a controlling position in the breeding business (supply of Day-old-Chick and Day-old-Layers), manufacture feed for third parties (independent farmers and contract farmers) and for their own (captive) demand (integrated farms) and to some extend have slaughtering capacity to cater urban consumers with processed poultry meat.

The total market for commercial poultry feed (excluding home mixing) in Bangladeshi is currently estimated at 3.05 MN MT, composing by 1.83 MN MT by the broiler sector and 1.23 MN MT by the layer sector. Ingredients for feed production are for a large extend imported. Corn is locally sourced at around 40-50% and soy is locally sourced at around 60-65%.

A 5% advance trade value-added tax (ATV) applies for all ingredients and poultry products, ingredients and machinery imported into Bangladesh. This tax adds on top of regular custom duties (CD), advance income taxes (AIT) and regulatory duties (RD) poultry entrepreneurs incur. Effective taxation on imported poultry products ranges from 6.33% - 60.31%.

To meet the growing domestic demand, the productivity of the Bangladesh poultry sector (i.e. competitive position) needs to increase significantly by introducing enhanced (more knowledge-intensive) production techniques.

The estimated capacity expansions and anticipated investments in both the poultry meat and layer segments till 2025 suggest significant Dutch-Bangladeshi Business-to-Business opportunities. An estimated 175 MN additional broilers and 7.6 BN eggs are essential to comply with assumed increase in consumption and population.

Estimated capacity expansions in the broiler segment till 2025	Volumes	Anticipated investments in the broiler segment till 2025
Breeding & hatching	➢ 1.3 – 1.5 MN broiler PS (approximately 50-70 additional broiler breeder farms). ➢ 175 MN DOC (approximately 6-8 additional hatcheries).	➢ EUR 4 – 6 MN investment in breeder farm housing equipment. ➢ EUR 10 – 15 MN investment in hatchery equipment.
Feed	➢ 0.4 – 0.5 MN MT feed production (approximately 3-5 additional midsized feed mills 20-40 MT/h capacity).	➢ EUR 25 – 40 MN investment in feed milling equipment value.
Housing	➢ 175 MN broilers.	➢ EUR 25 – 40 MN investment in broiler housing equipment.
Processing	➢ 70 MN broilers (approximately 8-10 additional midsized slaughterhouses of 25,000 birds/day capacity).	➢ EUR 5 – 15 MN investment in slaughtering and cold storage equipment.

Estimated capacity expansions in the layer segment till 2025	Volumes	Anticipated investments in the layer segment till 2025
Breeding & hatching	➢ 185,000 – 195,000 layer PS (approximately 60-65 additional layer breeder farms). ➢ 36 MN DOL (approximately 1-2 additional hatcheries)	➢ EUR 0.5 – 1.0 MN investment in breeder farm housing equipment. ➢ EUR 3 – 5 MN investment in hatchery equipment.
Feed	➢ 0.6 – 0.7 MN MT feed production (approximately 4-6 additional midsized feed mills 20-40 MT/h capacity).	➢ EUR 30 – 50 MN investment in feed milling equipment value.

Housing	➢ 36 MN layers	➢ EUR 30 - 50 MN investment in layer housing equipment.
Egg handling	➢ 7.6 BN eggs	➢ EUR 3 – 5 MN investment in egg handling & grading equipment.

Current sector development constraints include frequent disease outbreaks (as a result of poor animal health policies and disease control and low biosecurity standards at farm level), relatively high costs (due to strong dependency on imported ingredients and feed milling inefficiencies), an underdeveloped downstream (slaughtering and cold chain) segment and absence of access to finance (particularly for small and medium-sized enterprises and the informal sector). Most of these constraints can be ascribed to structural underinvestment (within the poultry sector and related industries), a lack of (international) competition and insufficient knowhow and skills of those active in the sector.

This study, conducted by Larive-LightCastle, aims to provide insight into the poultry sector in Bangladesh to understand the challenges and needs of both public and private stakeholders, identify (business) opportunities (for sector development) and link these to the Dutch stakeholders in the poultry sector, allowing to increase Dutch private sector engagement in Bangladesh and strengthen the local poultry sector.

This report provides a number of recommendations to strengthen the poultry sector in Bangladesh by applying Dutch knowledge and expertise via Government-to-Government, Knowledge-to-Knowledge and Business-to-Business engagements.

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1. Introduction

1.1 Study background and relevance

This study derives from the Netherlands multiannual strategy 2019-2022 on Bangladesh, which describes the intentions to conduct market scans to scope (business) opportunities. The Embassy of the Kingdom of the Netherlands in Dhaka identified the poultry sector as a key area to support trade and investment between the Netherlands and Bangladesh.

Poultry is the most important and advanced segment of the livestock sector in Bangladesh, making it interesting for both domestic entrepreneurs and foreign investors. Over the years, the demand for poultry products in Bangladesh has grown significantly; per capita consumption per year increased to 8.5 kg poultry meat and 5.1 kg (104 pieces) eggs in 2019. However, to meet the growing domestic demand, the productivity of the Bangladesh poultry sector needs to increase significantly.

The Netherlands is internationally renowned for responsible and sustainable production of poultry products, innovation, productivity and creation of added value. Policies and practices applied in the Netherlands regarding food quality, product safety, hygiene, efficiency, and animal health and welfare are considered as the highest international standards. The Dutch poultry sector (knowledge institutes, government agencies and private sector) therefore could contribute significantly to the development of the poultry sector in Bangladesh. Additionally, the Netherlands can tackle current sector challenges and position itself as a trusted partner for the private sector in Bangladesh.

At current, there are no Dutch Government-funded activities on poultry in Bangladesh. The Netherlands is gradually phasing out its bilateral aid support to Bangladesh and tries to facilitate the *aid to trade transition* by paving the way for Dutch companies and knowledge institutes, enabling them to engage in the Bangladesh market. As such, the Dutch government commenced this poultry sector study which aims to:

- Provide insights into the poultry sector in Bangladesh (value chain, bottlenecks & opportunities).
- Offer clear handles and directions for potential future actions, allowing to increase Dutch private sector engagement in Bangladesh and strengthen the local private sector.
- Increase awareness amongst Dutch stakeholders about the opportunities and developments in the poultry sector in Bangladesh.
- Increase awareness amongst Bangladeshi stakeholders about the value proposition of Dutch companies and knowledge institutes (capabilities & solutions).

1.2 Methodology

This study has been performed on behalf of the Netherlands Enterprise Agency by Larive International B.V., a Netherlands-headquartered business development advisory firm specialized in assisting companies in developing and implementing their market entry or expansion strategies in(to) high-growth emerging markets. Larive International is the parent of the Larive Group, a license-based network with exclusive members in 22 countries throughout Asia, Central & Eastern Europe, Turkey and Sub-Saharan Africa. In Bangladesh, Larive is represented by LightCastle Partners Ltd. (the combination is hereinafter referred to as *"Larive-LightCastle"*).

The analysis has been completed on a 'best effort' basis through desk research and qualitative research, including a vast number of in-depth interviews with private sector players (independent and integrated companies active in breeding, feed manufacturing, farming, processing and channel players such as dealers, distributors, traders and retailers) in all Bangladesh divisions (Barisal, Chittagong, Dhaka, Khulna, Mymensingh, Rajshahi, Sylhet and Rangpur), public stakeholders (policy makers, regulatory departments, business associations, universities/educational institutes and NGO's) and financial institutions. Annex 1 shows an overview of all interviewed stakeholders for this study.

In addition to the expert interviews conducted by Larive-LightCastle in Bangladesh, a number of Dutch poultry stakeholders have been contacted to get a better understanding of their views on the business opportunities in Bangladesh, how Dutch actors could strengthen the sector and how knowledge transfer between Bangladesh and the Netherlands can be stimulated.

1.3 Key country facts and figures

Bangladesh inhabits approximately 167 million (MN) people and has a relatively young population; 28% is younger than 15 years and 95% of the population is younger than 65 years respectively. The population of Bangladesh has been growing at a compound annual growth rate (CAGR) of 1.2% since 2013. By 2030, Bangladesh is expected to reach a population of 186 MN.

Bangladesh ranks within the top-10 of the most populous countries worldwide. In perspective, the country inhabits 10 times the number of Dutch residents, while Bangladesh's surface is 3.5 times the surface of the Netherlands. The capital Dhaka (including its agglomerations) is estimated to host over 20 MN inhabitants (>12% of the country's population) This dense population also has its advantages in terms of economies of scale, making transportation and distribution relatively less costly.

The population is spread across eight divisions and 64 districts (*'zilas'*). The urbanization rate is expected to increase from 34% in 2015 to 42% in 2025. Currently, roughly 80% of the Middle and Affluent Consumer (MAC) population resides in Dhaka and in the Eastern port city of Chittagong. It is expected that the MAC population will decentralize across other cities, with greater infrastructural investment supporting the process.

Bangladesh has been among the fastest-growing economies in Asia during the past decade and its GDP grew with 7.9% in 2018, reaching EUR 245.5 BN (reference: Netherlands EUR 772.7 BN). The GDP growth rate is expected to remain roughly at par with the current rate (7-8% per year) until 2025. Income per capita is expected to increase, thereby further boosting consumption. The growing and more prosperous MAC population offers opportunities for economic growth and will likely be the key target for the commercial industry in the next decade.

The Bangladesh Development Authority (BIDA) has been exerting considerable efforts to attract foreign investment in the country. These include amongst others tax exemption for certain sectors, absence of import duties for export-oriented sectors and flexible capital repatriation policies. As a result, the country has succeeded in attracting more foreign direct investment (FDI), reaching EUR 3.2 BN in 2018, growing with 68% relative to 2017.[1] Advantages of investing in Bangladesh include:

- Strong GDP growth and robust macroeconomic fundamentals.
- Ability to attract low-cost labour.
- First mover advantage.

1 Source: UN Trade and Development - World Investment Report 2019.

- Strategic position to supply North East India (so called ‘seven sister States’: Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura).
- FDI incentives and a favouring legislative environment.

The Bangladesh government has further established bilateral trade agreements and investment treaties to prevent double taxation, including with the Netherlands (Double Taxation Agreement since 1995). As Bangladesh is regarded as a “least developed country”, the country enjoys trade preferences, causing market access to be more preferential. This will likely be a major contributing factor to the acceleration of the economy.[2]

However, Bangladesh remains a challenging country to successfully establish a foothold due to amongst others:

- Underdeveloped physical infrastructure (ports, roads, power).
- Lack of transparency, burdensome and slow bureaucratic processes and institutionalised corruption.
- Underdeveloped financial sector.
- The country’s vulnerability to natural disasters (landslides, cyclones, floods, earthquakes etc.).
- Inadequately diversified exports, being dependent on the textile sector.

This is also underlined in the World Bank’s ranking in terms of *‘Ease of Doing Business’* in which Bangladesh hold the #168 place in 2019. The country was lacking behind regional peers such as India and Myanmar amongst others (see Figure 1).

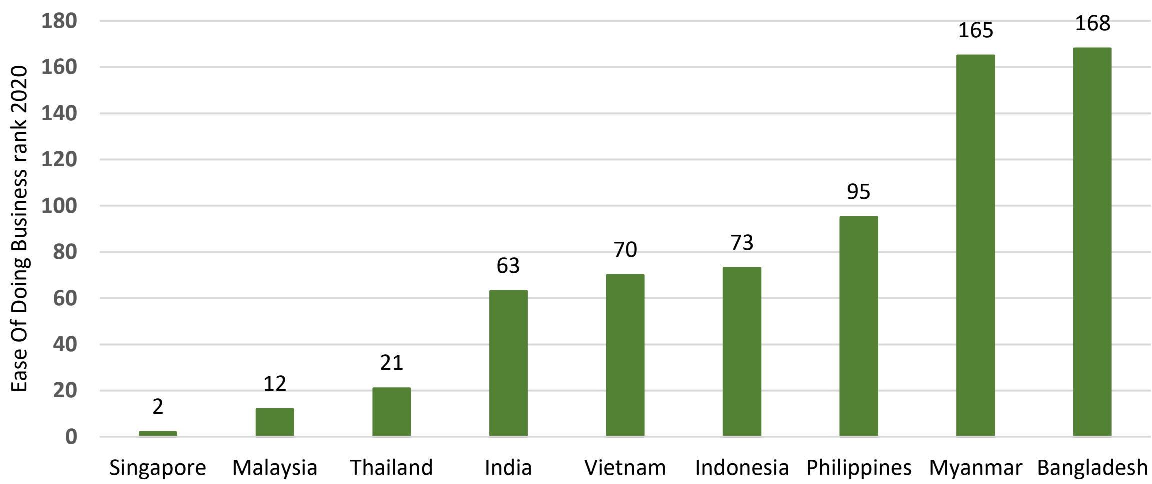


Figure 1: Country comparisons of Ease of Doing Business (2019-20203).

2 Source: Rahman, M. (2014). Trade benefits for least developed countries: The Bangladesh case market access initiatives, limitations and policy recommendations (No. 018). United Nations, Department of Economics and Social Affairs.

3 Source: World Bank, Ease of doing business rankings, 2020 https://www.doingbusiness.org/en/rankings

2. Facts and figures poultry sector Bangladesh

The poultry sector in Bangladesh primarily rears broilers and layers, although a few other species such as duck, pigeon, quail, goose, turkey and guinea fowl are also raised. Broiler meat is popular in Bangladesh, as it is the most affordable source of animal protein and well accepted from a religious perspective.

2.1 Historical development poultry sector Bangladesh

Historically, backyard farming provided the sole source of chicken meat and eggs in Bangladesh. Chickens were reared to meet family demands and productivity levels were low. The modernization of the poultry sector started around 1960 with the import of modern breeds, equipment and marketing systems. From that point onwards, the Bangladeshi poultry sector gradually shifted towards a commercial industry.[4]

Before 2000, commercial broiler and layer farms were dependent on imported Parent Stock (PS). At the beginning of the new millennium, several local companies started their parent and Grand Parent (GP) operations to meet the country's demand. The most commonly available broiler strains are Cobb 500, Ross 308, Indian River, Tiger Sasso, Hubbard and Arbor Acres, whereas the most reared layer strains are Novogen Brown/White, Hyline Brown/White, Shaver 579, ISA Brown/White and Bovine White.[5] Starting from the 1990s, the poultry sector experienced a significant growth of approximately 15-20% annually, until the outbreak of AI in 2007. In 2007-2008, 60% of the poultry farms and 70% of the hatcheries and breeding farms were closed due to this outbreak.[6]

Table 1: Status of meat and egg production and growth rate (%) Bangladesh 2004-2014 (Hamid, 2017 & DLS, 2015). [4,7]

	Meat		Eggs	
Year	**Production (MN MT)**	**Growth rate (%)**	**Production (MN)**	**Growth Rate (%)**
2004-05	1.06	-	5,623	-
2005-06	1.13	6.6	5,422	-3.6
2006-07	1.04	-8.0	5,369	-1.0
2007-08	1.04	0	5,653	53
2008-09	1.08	3.9	4,692	-17
2009-10	1.26	16. 7	5,742	22.4
2010-11	1.99	57.9	6,078	5.9
2011-12	2.33	17.1	7,304	20.2
2012-13	3.62	55.4	7,617	4.3
2013-14	4.52	24.9	10,168	33.5
Average growth rate (%)		**19.4**		**7.8**

Table 1 reveals that the poultry sector in Bangladesh recovered from AI from 2008-2009 onwards. The recovery was achieved by the implementation of more efficient practices, rather than establishing more commercial farms.

4 Source: Rahman, S., Jang, D-H., Yu, C-J. (2017). Poultry industry Bangladesh: entering a new phase. Korean Journal of Agricultural Science 44 (2), June 2017.

5Source: Hamid, M.A., Rahman, M.A., Ahmed, S., Hossian, K.M. (2017) Status of Poultry Industry in Bangladesh and the role of Private sector for its Development. Asian Journal of Poultry Science, (11), 1-13.

6 Source: Mamun, A. (2019). Technological Development in Poultry business; a comparative analysis between Bangladesh and Finland. Centria university of applied sciences, international Business Management.

7 Source: DLS. (2015). Annual Report on Livestock 2015. Division of Livestock Statistics, Ministry of Fisheries and Livestock, Farmgate, Dhaka, Bangladesh.

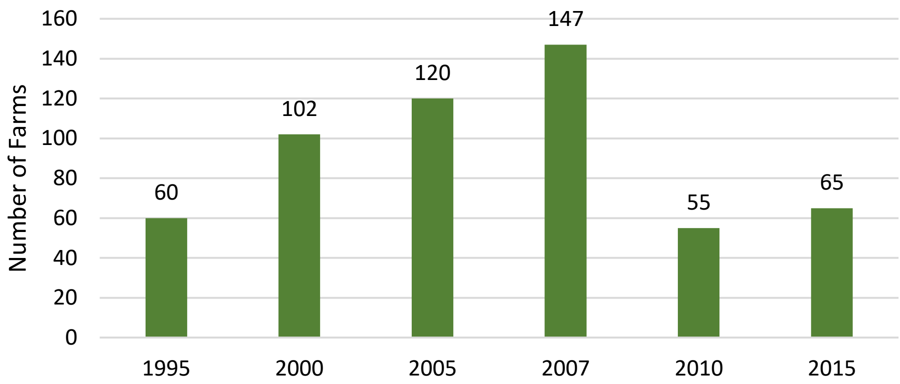


Figure 2: Number of commercial poultry farms in Bangladesh 1995-2015 (Hamid, 2017). [4]

The transition towards efficiency can be derived from Figure 2, which displays a significant decline in the number of commercial farms after the outbreak.

Table 2 confirms the transition towards more efficiency; the number of commercial hatcheries declines after the flu outbreak, whilst production increased.

Table 2: Growth of commercial poultry industry Bangladesh 1984-2019 (Kabir, 2018). [8]

Description	84-85	91-92	00-02	03-04	04-05	05-06	08-09	10-11
No. of Hatcheries	2	6	130	130	130	130	80	84
Broiler parent stock (x 1,000)	5	30	1,550	1,990	2,454	3,225	3,128	3,374
Day old broilers per year (x 1,000)	600	3,540	126,000	186,264	237,432	301,912	297,200	320,500
Broiler meat production (MT year-1)	0.48	4.54	170	217	276	320	297	320
Layer parent stock (x 1,000)	2	22	236	345	212	400	609	1,523
Day old layers per year (x 1,000)	160	2,025	21,240	30,960	19,080	25,380	42,600	106,600
Egg production (x 1,000,000)	48	610	3,430	4,780	5,623	5,422	5,653	6,078

Along with transformations in the commercial poultry sector, backyard poultry rearing is similarly subject to significant changes. Backyard farming is associated with more high yielding breeds and crossbreds such as Sonali and Deshi. The Sonali is a cross-breed of Rhode Island Red cocks and Fayoumi hens and has a similar phenotypic appearance to that of local chickens. Deshi is the free ranged, naturally hatched traditional/rural backyard scavenging local chicken (i.e. no professional breeder farms & hatcheries). The backyard sector is gradually transforming from traditional family (subsistence) farming towards more professional farming practices that involve more capital, productivity and profitability.[9]

8 Source: Kabir, S.S.K. (2013). Helping Bangladesh achieve MDG goal and vision 2021: The role of the poultry industry. Proceedings of the 8th International Poultry show and seminar, February 28- March 3,2013 Dhaka, Bangladesh, pp:14-16.

9 Source: Rahman, S., Jang, D-H., Yu, C-J. (2017). Poultry industry Bangladesh: entering a new phase. Korean Journal of Agricultural Science 44 (2), June 2017.

2.2 Current facts and figures poultry sector production Bangladesh

According to industry experts, current investments (2019) in the Bangladeshi poultry sector are valued at EUR 3.7 BN. Effective policy and infrastructural support from the government are expected to facilitate the poultry industry to double this value in the next 10 years.[10]

The sectors' production can be divided into four poultry segments: (1) Broiler, (2) Layer, (3) Sonali, and (4) Deshi.

1. Within the poultry sector, broiler chicken is the most consumed and reared variety. The growth in this segment is influenced by the developments in the modern food processing industry, including the arrival of fast-food chains that demand large numbers of chickens every day. KFC, for example, operating 21 outlets in Bangladesh, sources poultry meat from local producers such as Aftab. The CAGR of the processing segment from 2017 to 2019 was estimated at 9%.
2. The layer poultry segment provides 12.5 BN eggs for the Bangladeshi market.
3. Sonali chicken is a local variety with relatively high meat content. Consumers prefer Sonali over regular broiler meat as it is perceived as safer and fresher. The current increase in consumer awareness regarding food safety makes Sonali the fastest-growing segment. In 2018, the percentage of Sonali chicken consumption was around 20% of total poultry meat consumption, with the share reaching 23% in 2019. Faced with fast consumption growth, broiler farmers in the Gazipur region have shifted for a large extend to Sonali rearing. Besides, Sonali account for the production of 3 BN eggs annually.
4. The local Deshi chicken is free ranged and naturally hatched. Consumers have a strong preference for Deshi chicken and is therefore found to be the most expensive.

In all four poultry segments, different types of farms can be distinguished, ranging from large-scale commercial farms, medium-scale contract and independent farms and traditional small-scale independent farms. Table 3 displays the estimated number of birds per poultry segment in 2019. Section 2.5 provides a more detailed description of the poultry value chain in Bangladesh and the production volumes involved.[11]

Table 3: Estimated number of birds per poultry segments Bangladesh in 2019 (Larive-LightCastle, 2019).

Poultry segment	Birds/year
Broiler	525 MN
Layer & Layer Sonali	74 MN
Sonali	250 MN
Deshi	50 MN

2.3 Consumption patterns: animal-based protein

Historically, fish has been the main source of animal protein consumed in Bangladesh. Rising disposable incomes in the past three decades caused the Bangladeshi population to demand more variety in animal protein sources. Subsequently, the demand for poultry-protein in Bangladesh increased. Besides, the increase in fish prices, rising health concerns and the fall in egg prices increased the popularity of poultry meat and eggs.[12]

10 Source: Larive-LightCastle (2019/2020), based upon USAID figures.

11 Source: Larive-Lightcastle (2019).

12 Source: FAO. (2015). World Agriculture: towards 2015/2030. http://www.fao.org/3/y4252e/y4252e.pdf

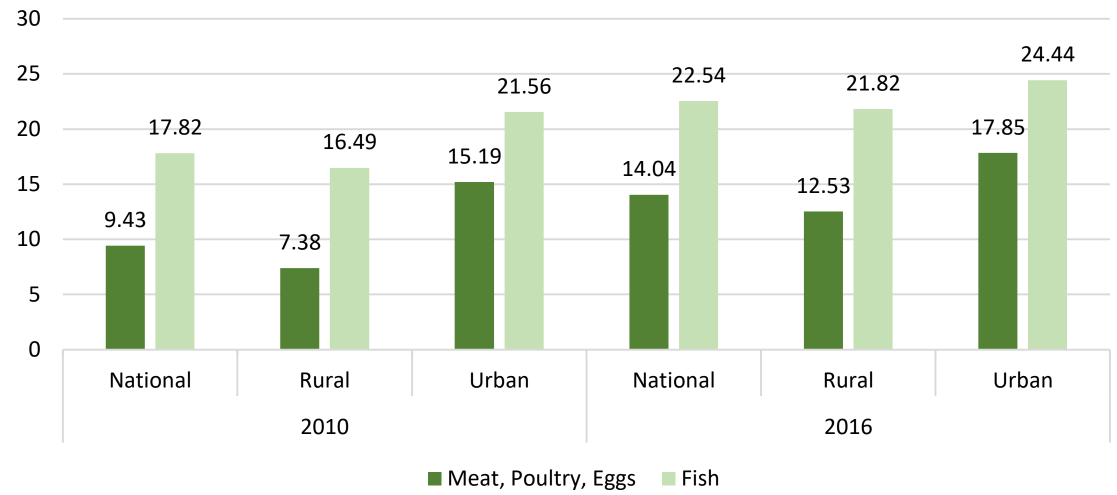


Figure 3: Average annual protein consumption 2010 & 2016 (kg/person/year) (Bangladesh Bureau Statistics, 2016). [13]

Diffused formal information is provided by different sources on the per capita animal protein consumption in Bangladesh. As displayed in Figure 3, the latest Bangladesh Household Income and Expenditure Survey (dating from 2016), reveals that total meat, poultry and egg consumption equals 14.04 kg per capita per year. The latest figures from the Bangladesh Department of Livestock (2019) stated that the per capita meat consumption (including fish) for 2018-19 was 45.62 kg/year (Figure 4).

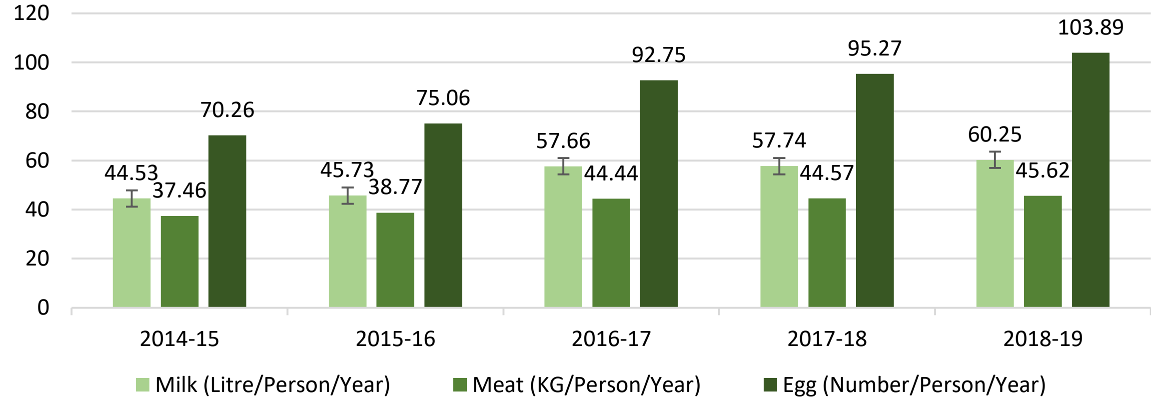


Figure 4: Average annual protein consumption 2014- 2018 (kg/person/year) (Bangladesh Department of Livestock, 2019)[14].

Based upon a combination of different formal sources, Larive-LightCastle established an overview of the historical and forecasted future animal-protein consumption in Bangladesh. Table 4 reveals a shrinkage of the gap between fish-based protein and other animal protein sources. The prospected Compound Annual Growth Rates (CAGR) from 2020 to 2025 for poultry meat and egg consumption are substantial with 3.1% and 4.5% respectively. In absolute numbers, the expected growth implies an increase of poultry meat consumption with 2.6 kg and an increase in egg consumption of 43 eggs per capita per year between 2019 and 2025.

13 Source: Household Income and Expenditure Survey 2016, Bangladesh Bureau of Statistics.

14 Source: Bangladesh Department of Livestock Services.

Table 4: Consolidated per capita protein consumption development Bangladesh (Larive-LightCastle, 2019).

Segment	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020p	2021p	2022p	2023p	2024p	2025p	CAGR 2010-2019	CAGR p2020-2025
Poultry meat	Kg per capita	4.1	4.5	5.0	5.5	6.1	6.7	7.4	8.1	9.0	9.9	10.4	11.0	11.3	11.7	12.1	12.5	**9.2%**	**3.1%**
Fish	Kg per capita	18.1	18.8	19.4	19.7	20.1	20.5	20.9	21.4	21.6	21.8	22.0	22.2	22.5	22.7	22.9	23.1	**1.9%**	**0.8%**
Cattle meat	Kg per capita	2.5	2.7	2.9	3.2	3.5	3.8	4.1	4.5	4.8	5.3	5.5	5.7	5.6	5.5	5.4	5.2	**7.8%**	**-0.9%**
Milk (bovine)	Litre per capita	30.1	32.7	35.5	38.3	41.3	44.5	45.8	57.7	57.7	60.3	63.3	65.8	68.4	70.5	72.6	74.0	**7.2%**	**2.6%**
Egg	Number per capita	43	48	58	64	66	70	75	93	95	104	113	122	131	137	143	147	**9.2%**	**4.5%**

Comparing the consolidated consumption data with current broiler, layer, Sonali and Deshi population figures, exposes a difference in the consumption and maximum production figures. Interviews with Bangladeshi stakeholders revealed the Bangladeshi poultry sector to anticipate on lower actual per capita consumption figures, as they hold accurate current production figures. Similarly, Larive-LightCastle presumes lower actual consumption amounts in this report. Based on the bird population, livestock population, production and the consumption trend as derived from Table 4, Larive-LightCastle calculated a total per capital animal-protein consumption of approximately 37.3 kg in 2019 (Table 5). Fish protein still accounts for the largest part of the total animal-protein consumption (19.7 kg), followed by broiler meat (5.5 kg), eggs (5.1 kg), red meat (4 kg), Sonali chicken (1.7 kg), other poultry species (0.9 kg) and duck (0.4 kg). Continuing this report, Larive-LightCastle utilizes the predicted growth rates from Table 4, while using the estimated animal-protein consumption figures as displayed in Table 5.

Table 5: Actual per capital protein consumption estimates 2019 (Larive-LightCastle,2019)

Segment	Estimated per capita consumption 2019 (kg)
Fish	19.7
Poultry-Broiler	5.5
Egg	5.1
Red Meat (Cattle)	4
Poultry-Sonali	1.7
Poultry-others	0.9
Duck	0.4
Estimated total	37.3

Comparing the estimated consumption figures to other Asian countries, per capita poultry meat and egg consumption in Bangladesh is comparable to levels in neighbouring Myanmar. Figure 5 displays the comparative overview illustrating the differences between several Asian countries. Malaysia tops the list in terms of poultry meat and egg consumption, which figures even above developed western economies. Taken the forecast consumption growth rates into account (Table 4), consumption levels per capita in Bangladesh will match the current consumption levels of Indonesia's in 6-8 years.

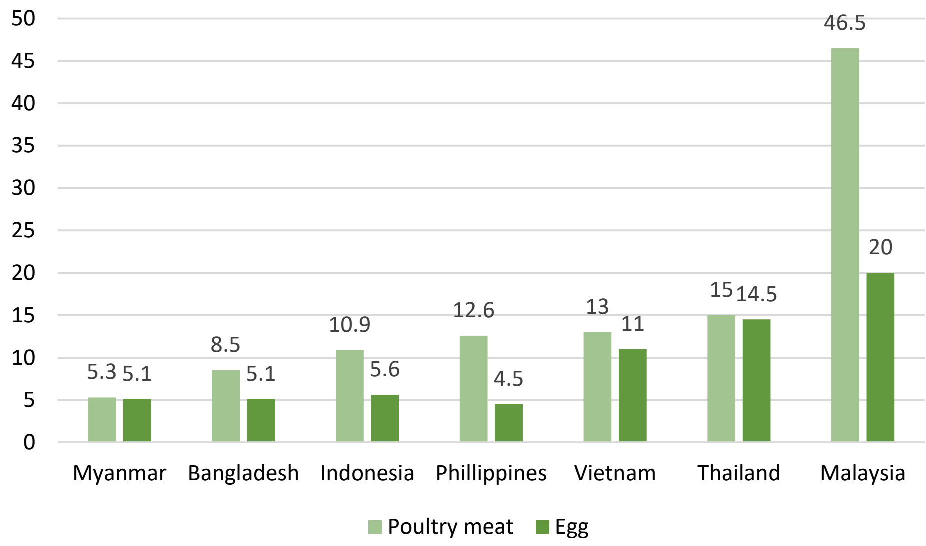


Figure 5: Country comparison per capita meat (kg) and egg (kg) consumption (OECD, 2017).[15]

2.4 Consumer prices poultry meat and egg

Market prices for poultry meat differ per poultry segment. Significant price differences are noticeable between broiler, Deshi, Sonali, duck and Raj Hash (goose) segments. Table 6 provides an overview of the different market prices per poultry segment and the average bird size per segment.

Table 6: Market prices and sizes poultry meat by species (Larive-LightCastle, 2019).

Poultry segment (unprocessed)	Average live weight (kg)	Consumer price range per Kg live weight (BDT)	Consumer price range per kg live weight (EUR)
Broiler	1.5 – 1.7	130 – 150	1.4 – 1.6
Sonali	0.9 – 1.1	250 – 270	2.7 – 2.9
Deshi	0.9 – 1.2	400 – 450	4.3 – 4.8
Duck	1.0 – 1.5	300 – 350	3.2 – 3.7
Raj Hash (Goose)	2.5 – 3.0	400 – 450	4.3 – 4.8

Due to its affordability and the variety of purposes, broiler meat is the most consumed poultry product in Bangladesh. On average, broilers are sold with a live weight of 1.5 - 1.7 kg and consumer prices range from EUR 1.4 to EUR 1.6 per kg of live weight.

Sonali chicken is the strongest contender in terms of consumption levels, primarily caused by its high meat content and safe and fresh image. Sonali is sold with an average live weight of 0.9 - 1.1 kg and consumer prices range EUR 2.7 to EUR 2.9 per kg of live weight (which is 80-90% higher than for broilers).

The Deshi chicken is the most expensive due to its value and nutritional content. Consumers perceive Deshi chicken to be a superior breed, having fewer residuals (antibiotics) in them as they are fed with homemade feed. Deshi birds are sold with an average weight of 0.9 - 1.2 kg. Consumer prices per kg of Deshi chicken range from EUR 4.3 to EUR 4.8 per kg of live weight, being more than 200% higher than broiler prices.

15 Source: OECD (2017)

Duck is eaten sparsely by consumers due to its lengthy preparation time and lack of awareness amongst Bangladeshi consumers. It is mostly consumed during celebrations. Duck is sold with an average live weight 1-1.5 kg. and prices range from EUR 3.2 to EUR 3.7 per kg of live weight.

Raj Hash (goose) and turkeys are niche markets in Bangladesh, with around 1,000 farms in both segments rearing these birds. An advantage of turkey rearing is that it takes less time (4 to 6 months for rearing) to reach big sizes (kg/bird). A male reaches 8-10 kg within 6 months and a female reaches 6-7 kg in the same period. The live weight price of turkey is ranging between EUR 4.3 and EUR 4.8.

Layer farmers usually sell their eggs in a batch of 100 eggs per crate to dealers with sales prices ranging between EUR 4.8 and 5.9 per crate. These dealers sell to wet markets, retailers and online retailers. Eggs are often sold to consumers per dozen and prices vary between different purchase channels (Figure 6).[16]

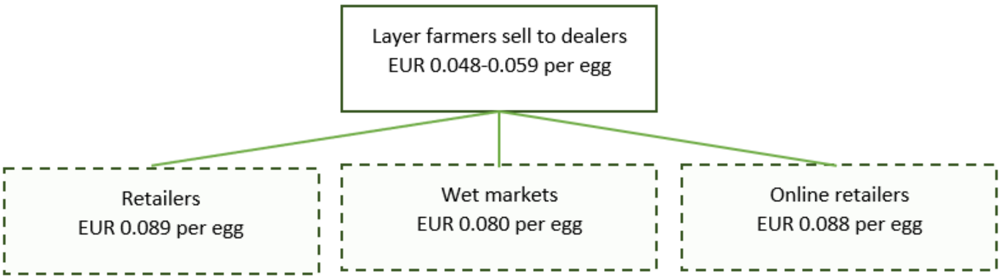


Figure 6: Egg prices at dealer and market level (Larive-LightCastle, 2020).

2.5 Value chain overview

Figure 7 displays the general overview of the broiler poultry sector supply chain in Bangladesh. An overview of the layer supply chain is given in Figure 8. Figure 9 displays an overview of the local Sonali and Deshi supply chains in Bangladesh. This section describes the different steps in the supply chain, including volumes and key stakeholders. Additionally, the genetics, feed inputs, feed, vaccines and medicines and dealer supply chain segments are addressed.

16 Source: Larive-Lightcastle (2020).

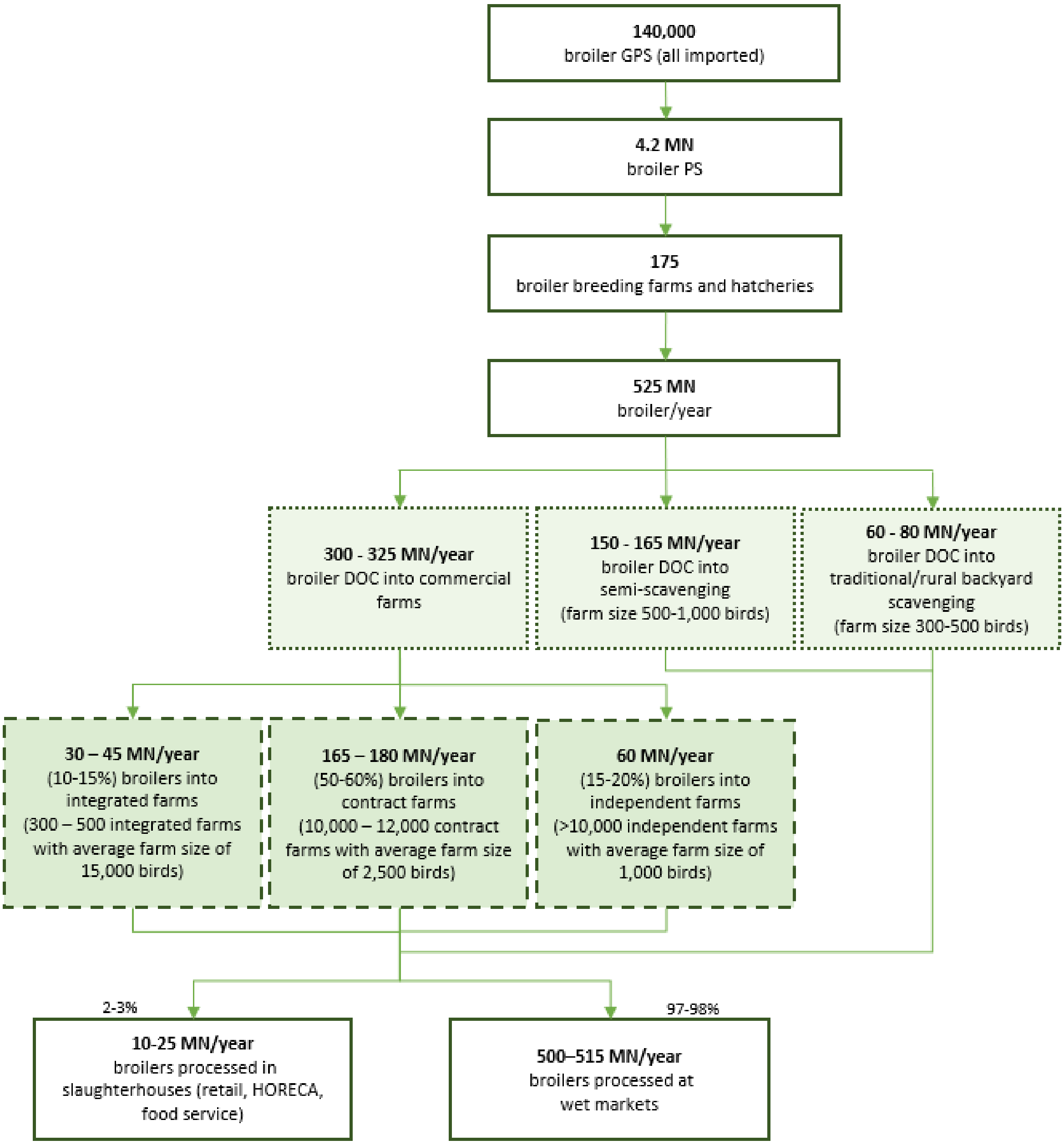


Figure 7: Visual overview of the broiler value chain in Bangladesh (Larive-LightCastle, 2019).

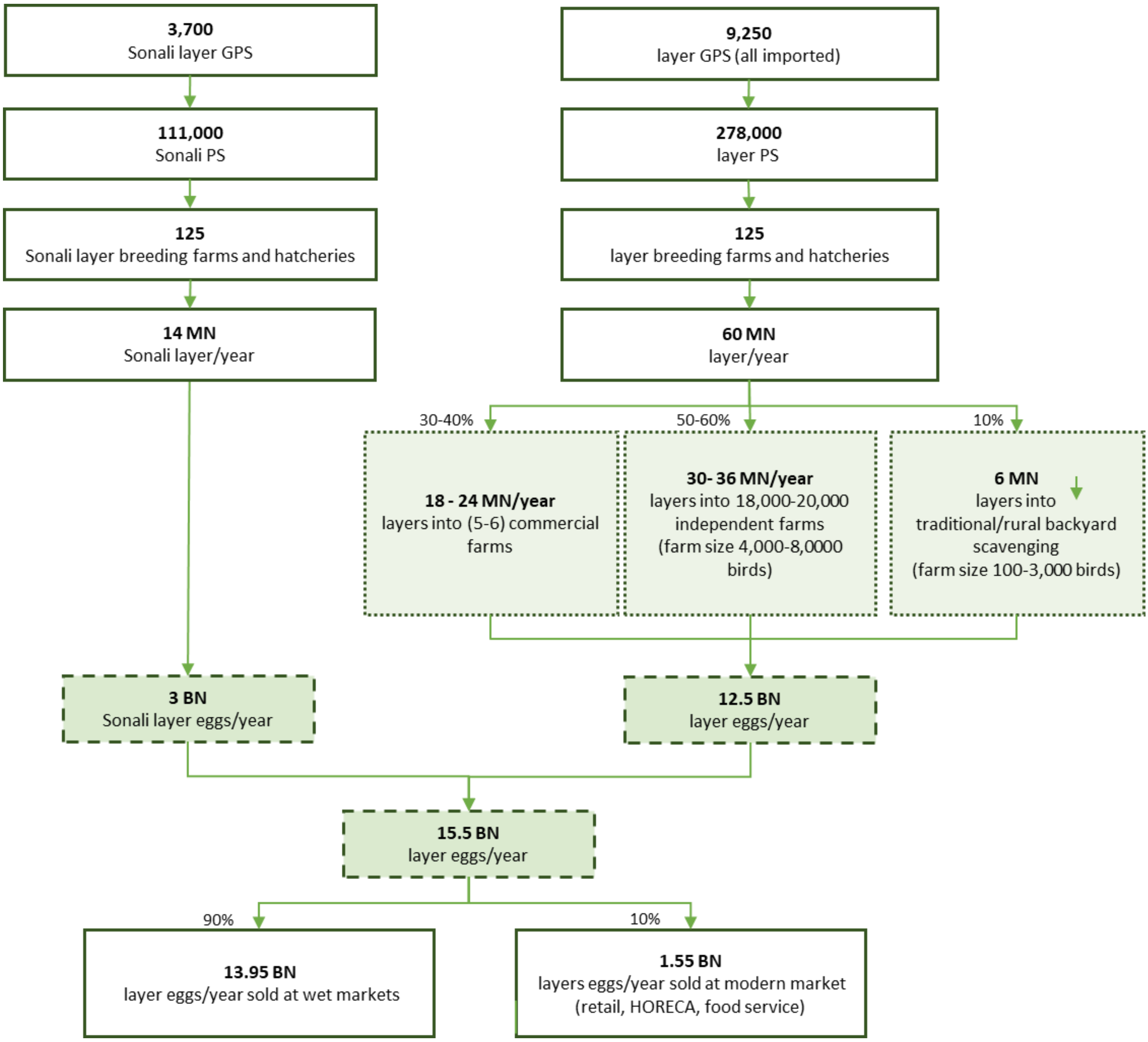


Figure 8: Visual overview of the layer value chain in Bangladesh (Larive-LightCastle, 2019).

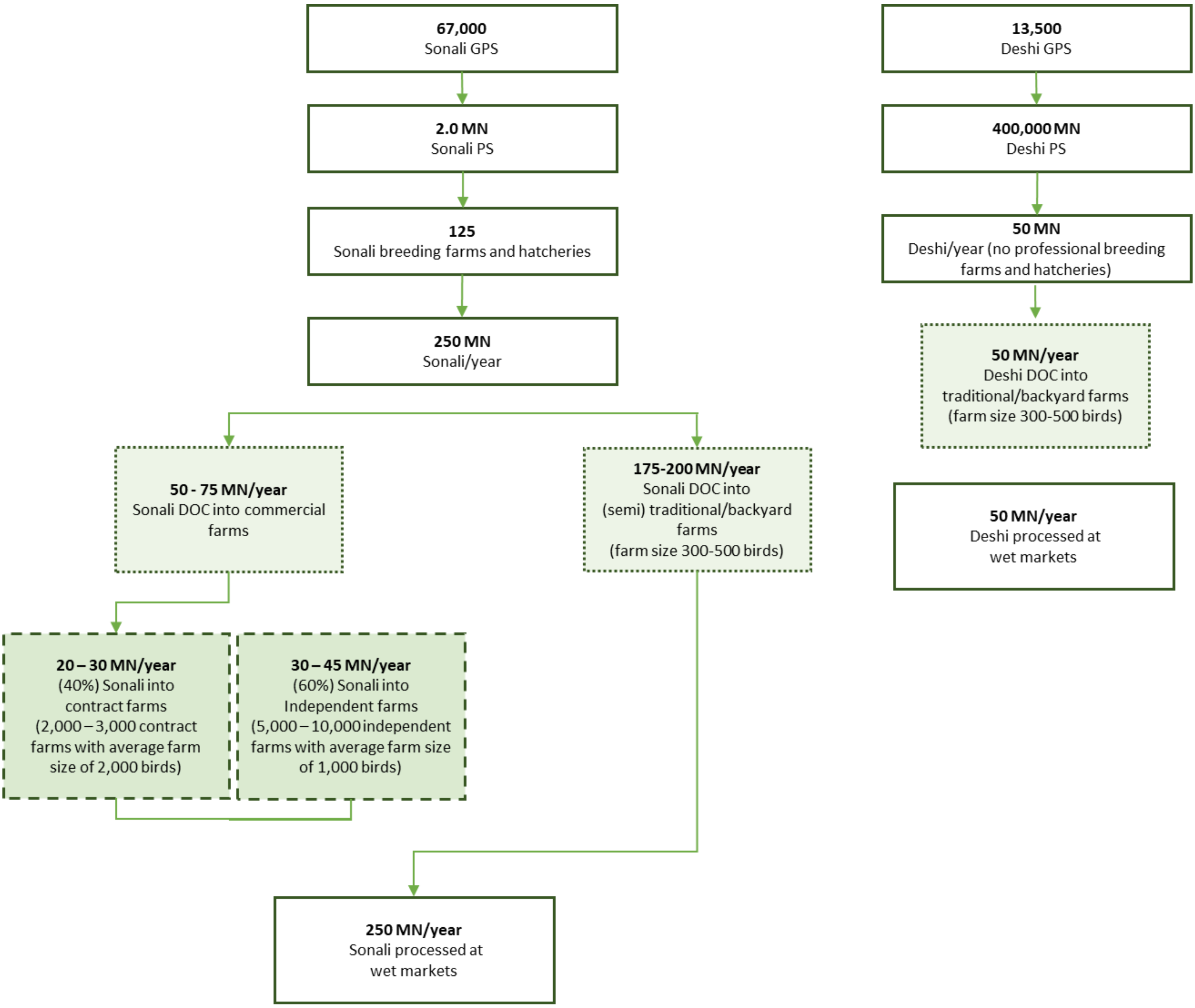


Figure 9: Visual overview of the Sonali and Deshi value chain in Bangladesh (Larive-LightCastle, 2019).

2.5.1 Genetics

Table 7 provides an overview of the operation GP farms in Bangladesh, the imported breeds and countries of origin. In addition to the broilers and layers GP varieties listed below, some breeders import Parent Stock (PS) as well, for example from France, USA, the Netherlands, Australia, New Zealand, Germany and Canada.

Table 7: GP farms and available genetics in Bangladesh in 2019 (Mostofa, 2014 & Larive-LightCastle, 2019).[17] [18]

<table>
<tr><th>GP farm operator</th><th>Variety</th><th>Type of breeds</th><th>Imported from</th></tr>
<tr><td>Aftab</td><td>Hubbard classic</td><td>Broiler</td><td>France</td></tr>
<tr><td>C.P.</td><td>COBB 500</td><td>Broiler</td><td>USA, the Netherlands</td></tr>
<tr><td>Kasila</td><td>COBB 500</td><td>Broiler</td><td>USA</td></tr>
<tr><td>Kazi</td><td>COBB 500</td><td>Broiler</td><td>USA</td></tr>
<tr><td>A.G. GP</td><td>Hubbard classic</td><td>Broiler</td><td>France, USA</td></tr>
<tr><td>Nourish</td><td>COBB 500</td><td>Broiler</td><td>USA</td></tr>
<tr><td rowspan="2">Paragon</td><td>Hubbard classic</td><td>Broiler</td><td rowspan="2">France, USA</td></tr>
<tr><td>Novogen brown</td><td>Layer</td></tr>
<tr><td>Rashik/ Zaman Group</td><td>Lohmann meat</td><td>Broiler</td><td>USA, Australia, New Zealand</td></tr>
</table>

2.5.2 Grand Parent farms

GP farms in Bangladesh are operated by the country's largest poultry integrators in more advanced houses, providing higher levels of biosecurity. An overview of the eight GP farm operators including contact details can be found in Annex 2.

Broiler GP

In 2018, eight companies operated fifteen broiler GP farms, hosting in total over 140,000 birds. All broiler GPs are imported from overseas (France, the USA, the Netherlands, Australia and New Zealand). Kazi is the market leader in the broiler GP segment, holding 34% (49,000 birds) of the total broiler GP flock within its two operating facilities, followed by CP, Nourish and Paragon. An overview of the broiler GP operators including their market shares and flock sizes are displayed in Table 8 and Figure 10.[19]

Company	Number of broiler GP	Number of broiler GP farms	Market share (%)
Kazi	49,000	2	34
C.P.	24,000	2	17
Nourish	22,500	2	16
Paragon	14,000	2	10
Aftab	12,000	2	8
Rashik/Zaman Group	8,500	1	6
Kasila	6,500	1	5
A.G. GP	5,800	1	4
Total	**142,300**	**13**	**100**

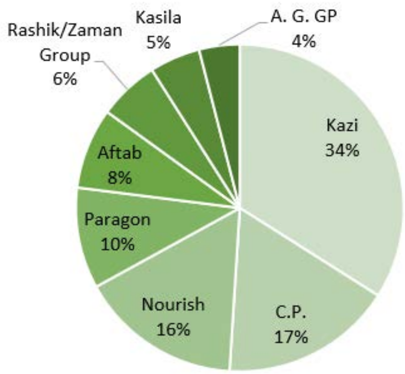


Table 8: Broiler GP operators and market shares per company &
Figure 10: Market shares per broiler GPS company (Larive-LightCastle, 2019).

Layer GP

Bangladesh hosts a single layer GP farm, which is owned by Paragon and houses 9,250 birds. In 2019, 4,000 layers have been imported by Paragon.

17 Source: Mostafa Rob, M.G., 2014. Bangladesh poultry directory. Edited and Published by Md. Golam Mostafa Rob, Shantinagar, Dhaka, Bangladesh. http://bpdbd.net/

18 Source: Larive-Lightcastle (2019).

2.5.3 Breeding & hatching

Formal registered breeders and hatcheries in Bangladesh apply more advanced housing systems to assure a higher level of biosecurity. Modern solutions, techniques and systems are being used by the large integrators, resulting in relatively good hatchability results. Other breeders and hatcheries lack these solutions, techniques and systems, which result in less efficient operations. The breeding and hatchery segment in Bangladesh is characterized by a relatively high level of informal PS farms. An overview including the names and contact details of the main breeders and hatchers in Bangladesh can be found in Annex 3.

Broiler PS

The operations of the fifteen broiler GP farms in combination with the broiler PS imports result in a domestic flock broiler PS flock of 4.2 MN. Bangladesh resides 70 formal registered broiler breeder farms and hatcheries of which 40 larger-sized and 30 small/medium-sized companies. Another 105 informal broiler PS farms are located in Bangladesh. The country's largest broiler breeders and hatcheries are ACI-Godrej, A.G. GP, Advance Animal Science, Aftab, CP, Kasila, Kazi, Nourish, Paragon, Protimax International and Rashik/Zaman Group.[19] The broiler PS market is visualised in Figure 11.

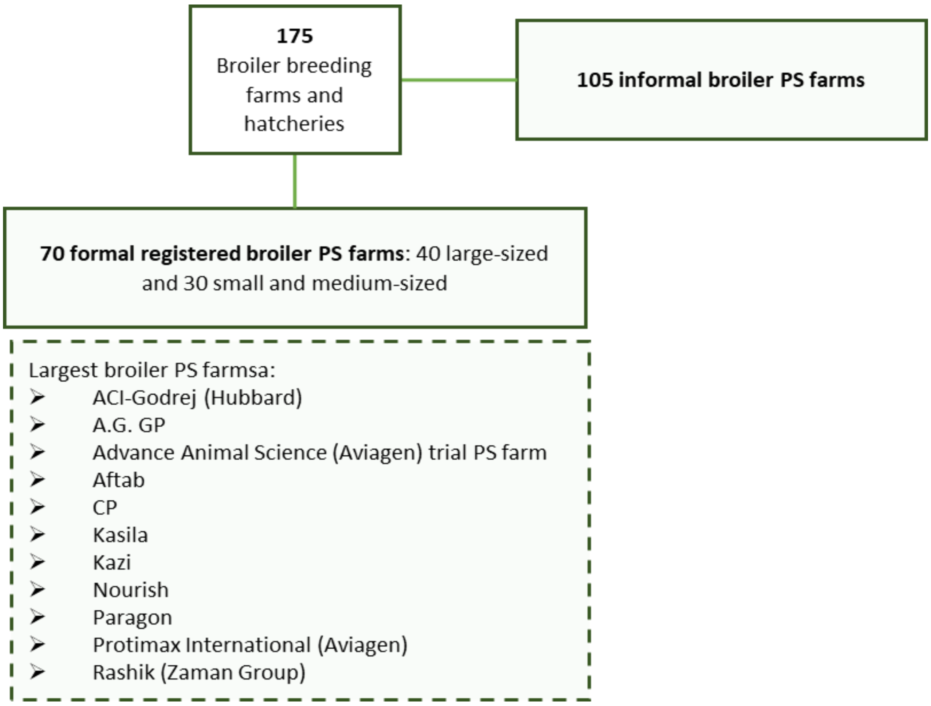


Figure 11: Broiler PS market (Larive-LightCastle, 2019)

Layer PS

There are 50 formally registered layer breeder farms and hatcheries in Bangladesh, of which 35 large-sized and 15 small/medium-sized. Additionally, 75 informal breeder farms and hatcheries have been identified. The PS layer farms house a total of 278,000 birds. The country's largest layer breeders and hatcheries are ACI-Godrej, Advance Animal Science, Advance Bio-Products, Aftab, Ample Animal Care, Kazi, Paragon, Protimax International and Zaman Group. The layer PS market is visualised in

19 Source: Larive-LightCastle (2019).

Figure 12.[20]

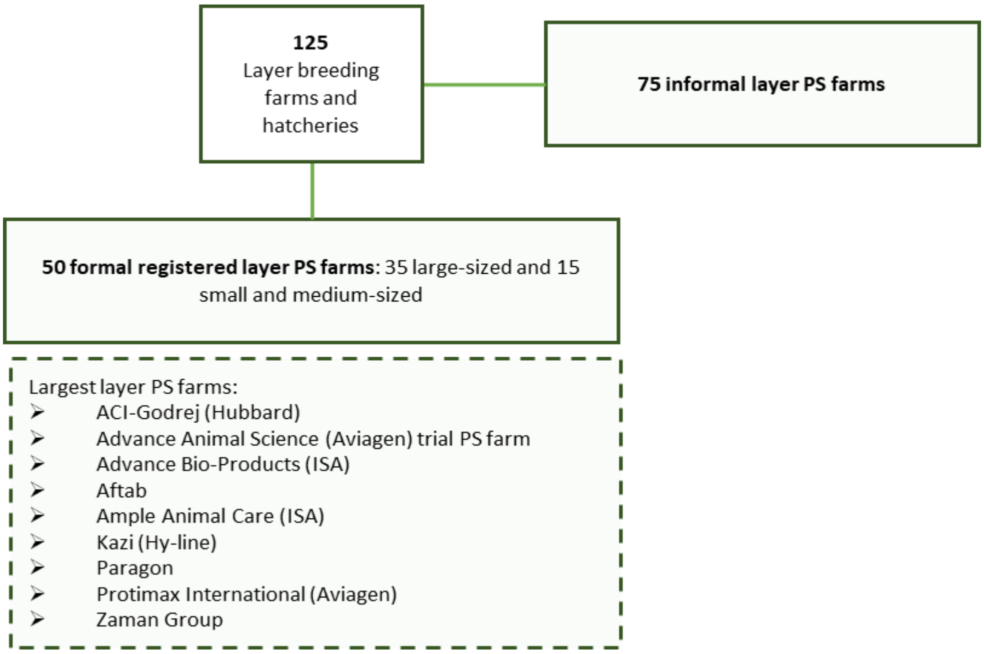


Figure 12: Layer PS market (Larive-LightCastle, 2019)

2.5.4 Farming

The farming segment of the poultry supply chain in Bangladesh is less consolidated and professionally organised than the GP and PS segment. Credit plays an important role within the Bangladesh poultry sector, as most of the farmers buy Day Old Chicks (DOC) and Day Old Layers (DOL) as well as feed and other inputs on credit.

Broiler farming

Figure 13 provides an overview of the number of broilers in a number of Asian markets (2017 figures). The figure shows that in 2017 the amount of broilers in Bangladesh was roughly equal to the number in Vietnam.

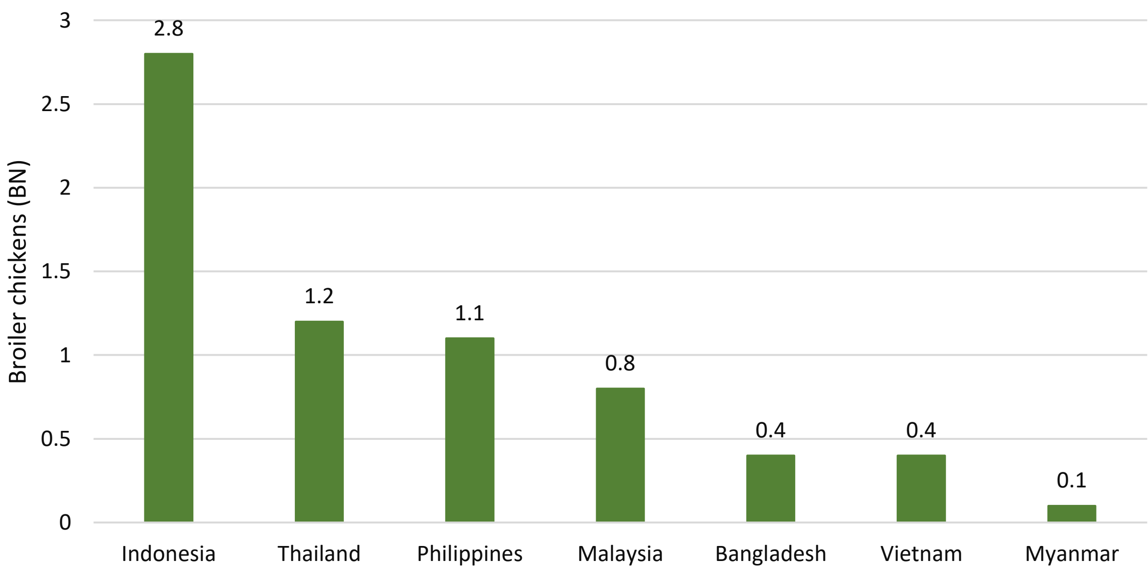


Figure 13: Broiler bird numbers country comparisons (2017)[20]

Out of the 525 MN DOCs raised in Bangladesh in 2019, approximately 60% (300-325 MN) have been reared in commercial farms, the remaining 40% (200-225 MN) in semi-scavenging / traditional rural backyard conditions. Figure 7 displays the division of broiler DOC among different farm types in Bangladesh.

Integrators represent 10-15% of the commercial broiler farms, raising 30-45 MN broilers in their own farms annually. In total, there are an estimated 300 – 500 broilers farms belonging to integrators with average farm size of 15,000 birds per farm. An average commercial poultry farm in Bangladesh is 200-300 ft (60-100m) in length and 40-50 ft (12-15 m) wide.

The largest part (165 – 180 MN/year – 60-65%) of commercial broilers are reared by contract farmers. An estimated 10,000 – 12,000 contract farmers raise broilers with average farm size of 2,500 birds. The far majority operates open houses with relatively low levels of farming techniques and biosecurity, with in some occasions applying ventilation, heating and closed water systems. Integrators supply feed and DOC to contract farmers and have offtake agreement for fully grown broilers. The remaining 20% of the commercial DOC are reared by approximately 10,000 independent farmers, each having an average of only 1,000 birds/farm. The profitability of these farms is questionable.

Average broilers cycles in Bangladesh range between 30-35 days depending, on on-farm conditions (level of technology applied),farming practices and market prices. Mortality rates vary between 4% (closed houses belonging to integrators) and 10% (small-scale open farms). The pictures in and Figure 15 give an impression of an average broiler farm in Bangladesh.[21]

Figure 14: Picture of just arrived DOC at a broiler farm in Bangladesh (Larive-LightCastle, 2020)

20 *Source: Larive-Clarity Research, market research Indonesian poultry sector (2019).*

21 *Source: Larive-LightCastle (2020).*

Figure 15: Pictures of an open-house, low-tech broiler farm in Bangladesh (Larive-LightCastle, 2020).

Layers

The activities of 50 formal and 75 informal layer PS farms result in an output of 60 MN DOL a year. Around 30 to 40% (18-24 MN) of these DOLs are raised at six large integrated commercial farms. Kazi is the largest player in the layer segment in Bangladesh with >20% market share having 12.7 MN layers and three commercial farms with a total capacity of 10 MN eggs/day.

Figure 8 displays the division of DOL amongst different farm types in Bangladesh.

Gross of the layers (50-60%) are kept at independent farms whose flock counts ranging from 4,000 to 8,000 birds per farm. These farms apply relatively low-tech equipment and basic housing systems. Figure 16 provides an impression of common layer farm in Bangladesh. According to the Bangladeshi Feed Industry Association (FIAB) and the World's Poultry Science Association (WPSA), a number of investments in the layer segment are in the pipeline, driven by the increasing demand for eggs.[22]

Additionally, 14 MN Sonali Layers DOLs result from Sonali breeding. In total, these Sonali birds produce 3 BN eggs a year.

Figure 16: Picture of layers at a common low-tech layer farm in Bangladesh (Larive-LightCastle, 2020).

22 Source: Larive-LightCastle (2020).

2.5.5 Processing and slaughtering

Professional poultry meat processing is a recent addition to the food industry in Bangladesh. Increasing demand for processed broiler meat is driven by urbanization, changing consumer habits and the gradual entry and expansion of major fast-food giants including KFC (and its local equivalents BFC and CFC), McDonalds and Nandos. The international fast-food giants as well as an increasing number of domestic chains demand hygienically slaughtered and processed broiler meat meeting international standards.

The Slaughter Act has been effective in Bangladesh since 2011. The act defines rules, regulations and restrictions for animal slaughter. Although the act has been in effect for almost a decade, many farmers and butchers are not aware of the act and governmental implementation lacks.

According to interviews with industry experts, there are at current no independent processors in Bangladesh. Those slaughterhouses active are all part of integrators, being (1) BRAC poultry, (2) Kazi, (3) Quality, (4) EON, (5) AG, (6) Paragon and (7) Aftab. Additionally, ATR Foods and the Bangladesh Army have their slaughterhouses. None of the existing processing plants is operating according to the WPSA standards, though slaughterhouse operators indicate to adhere to other international slaughtering standards. However, the Bangladesh governmental is not able to effectively control and enforce the rules and regulations with respect to slaughtering practices.

An estimated 2 to 3% of all 525 MN commercial broilers consumer per year (10-25 MN) are processed in these slaughter facilities. The facilities sell to retail, restaurants and the fast-food industry. The capacity of slaughterhouses ranges between 2,000 and 10,000 birds per day. Kazi is the largest player within the processing and slaughtering segment.

The Bangladesh Department of Livestock has undertaken an initiative to construct the first modern independent slaughterhouse in Chittagong City, with support from Chittagong City Corporation (CCC). This initiative also aims provide training to consumers, butchers, cattle traders, farmers and veterinarians. According to industry insiders, EUR 8.3 MN will be invested in the project. Dhaka South City Cooperation (DSCC) announced to rebuild five slaughterhouses in Kaptan Bazar, Hazaribagh, Gabtoli, Mohammed Krishi Market and Mohakhali. DSCC already started building two of these plants at costs of EUR 6.4 MN.

Establishing more professional slaughtering capacity (preferably run by independent operators) will be important for the development of the Bangladesh poultry sector, requiring more healthier and more uniform birds from farmers and stabilizing prices within the value chain. In addition, it will facilitate a shift from the unhygienic and unsafe wet markets (which are often a source of disease outbreaks) to professional and safe circumstances. The current COVID-19 pandemic might trigger additional investments in the slaughtering and further processing part of the value chain. Due to the pandemic, food safety awareness amongst consumers will most likely increase. Annex 4 provides an overview of poultry equipment vendors in Bangladesh, importing and selling machinery and equipment to feed mills, farmers and processors.

2.5.6 Wet markets

Over 97% of poultry meat and 90% of eggs in Bangladesh are sold at wet markets. Next to the fact that the professional retail market is less developed in Bangladesh than in other countries, Bangladeshi (as many Asian consumers) prefer live birds as they want to verify the health of the birds before it is being plucked. Consumers fear to purchase processed (cooled/frozen) poultry meat as they are not able to confirm the health of the bird, date of slaughtering etc. Besides, live sales are preferred as consumers believe it assures better taste and meat content. Wet markets can be found everywhere in Bangladesh, most of these located within the urban areas.

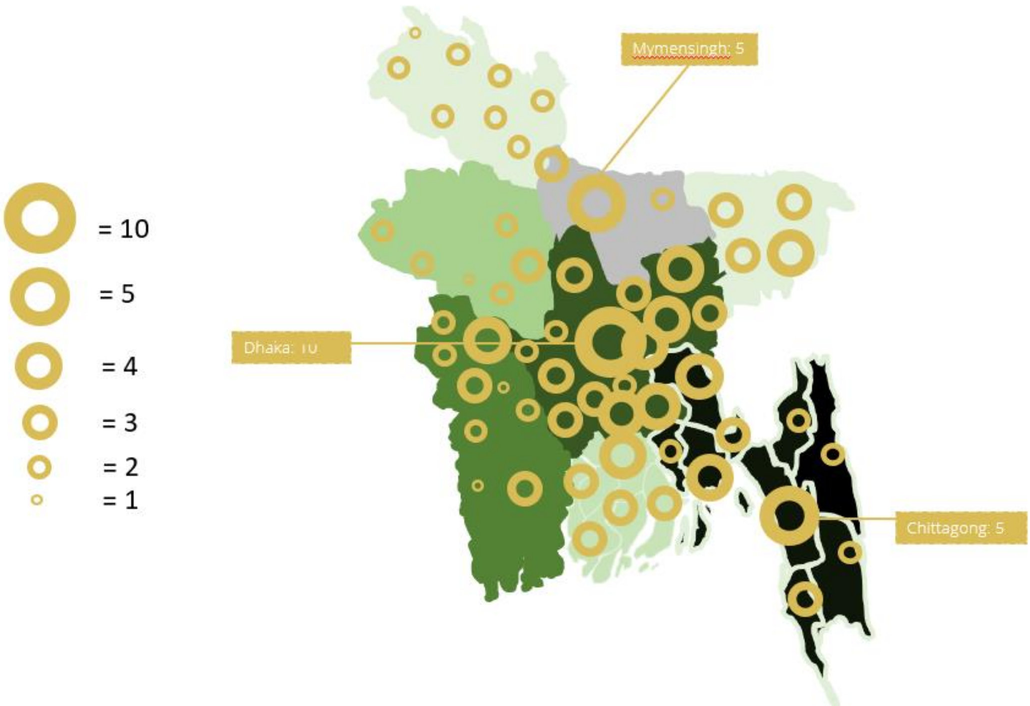


Figure 17: Main Wholesale wet market locations in Bangladesh

Figure 17 displays the geographical distribution of the largest wholesale wet markets in Bangladesh. Wet market traders buy poultry birds and eggs at these markets and sell them at smaller wet markets. A common finding is that farmers also bring their sick birds to wet markets, which facilitates the rapid spread of diseases at these markets.

2.5.7 Feed

Historically, cattle and poultry farming in Bangladesh revolved around the use of homemade feed from different types of agricultural by-products and kitchen waste. Gradually, the demand for commercially mixed feeds increased at the expense of home-mix alternatives, resulting in better livestock performances.

The Bangladesh feed market produced approximately 7 MN MT feed in 2019, of which 5 MN MT is considered as commercial compound feed, the remaining being home-mix alternatives. Out of the commercial feed, 36% or 1.8 MN MT can be attributed to the broiler segment and 24% or 1.2 MN MT to the layer segment. Both layer and broiler feed production have been growing substantially and each respective market volume has doubled over the last 6 years. Due to the strong growing demand for eggs, the demand for layer feed is expected to grow faster than broiler feed, reaching 1.9 MMT in 2025, whereas the broiler feed market is expected to reach 2.3 MMT in 2025.

Compared to other Asian markets, the feed sector in Bangladesh is relatively fragmented as the top-11 sector players represent 65% of the domestic feed production. The main market leaders are

Nourish, Quality and Paragon, having market shares of 15%, 8% and 7% respectively. The feed export market of Bangladesh is very small: only about 0.5% of produced feed is exported.

2.5.8 Feed inputs

The raw materials required for the production of poultry feed such as soybean meal, corn, rice bran and palm oil are insufficiently locally available. Bangladesh therefore imports a large portion from India, China and South America.

Corn is one of the main poultry feed ingredients as it contains sufficient amounts of energy and protein. The domestic corn production yield in Bangladesh remains insufficient and feed companies typically depend on imports of corn for at least 5-6 month per year. Only 40-50% of the required corn inputs are locally sourced and the remaining part is imported. The total domestic production of corn in Bangladesh is estimated at 3.5 MMT in 2019. The production of corn is more prominent in the Rangpur, Gaibandha, Kurigram, Nilphamari and Lalmonirhat districts. The peak corn harvesting season is from March to July. Corn prices during this season range from EUR 138 to EUR 165 per MT. The off-season price for feed manufactures ranges from EUR 213 to EUR 223 per MT.

For soybean meal, another main feed input, 64% of the demand is met by local producers, while the remaining is imported. Total domestic soy production is estimated at 1.4 MMT for 2019. Soybean is largely produced in the Noakhali and Laxmipur districts in the Comilla Division. The production of the Subarnchar Upazila (a region in the Noakhali district) and Ramgati and Kamalnagor Upazila's (regions in the Laxmipur district) are known to have higher production yields than other regions. Locally sourced soybean cake costs around EUR 400 per MT. All imported soybean is crushed in local mills to create oil and meal.

In general, all feed inputs are affected by seasonality in the domestic Bangladeshi market and by international price volatility and fluctuations. This causes the feed input side of the poultry value chain to be unpredictable, which is a concern for feed producers. In addition, most of the feed such as toxin binder, acidifier, vitamin minerals and nutrients are not locally produced and need to sourced internationally.

2.5.9 Vaccines and medicines

Bangladesh has been affected by avian influenza (AI) on 43 different occasions since 2007. Major outbreaks of AI occurred in 2007, 2009, 2011 and as recently as 2017. To combat the outbreaks, the Bangladeshi government adopted a national preparedness and response plan in 2007. According to the plan, all birds needed to be killed and buried to stop the outbreak. The Bangladesh Ministry of Fisheries and Livestock is responsible for compliance to the act. In the entire market, around 5,000 veterinarians are employed by the private sector whereas the Bangladesh government institutes have about 3,000.

Health issues in poultry are a major cause of concern as they have an inverse relationship with farm profits and working conditions. Veterinary vaccines can play a vital role in the prevention of disease outbreaks. Currently, few vaccines are manufactured locally by the Bangladesh Livestock Research Institute (LRI). The amount and variety of vaccines produced by the LRI is not sufficient to meet the national demand. As a result, most of the available vaccines are imported. Imports cause farmers to use vaccines while they are unaware whether the vaccines are consistent with the circulated pathogens in the field. Moreover, Bangladesh experiences difficulties in maintaining an uninterrupted cold chain system during transport of the vaccines.

Figure 18 provides an overview of all vaccines for poultry and other large and small animals available in Bangladesh, split between locally manufactured and imported vaccines.[23] Contact details of the main poultry medicine vendors are listed in Annex 5.

Poultry vaccines- locally manufactured

- Fowl Typhoid (Killed)
- Duck Plague (live)
- Baby-chick Ranikhet Disease (BCRDV live)
- Pigeon Pox Vaccine (live)

Large and small animal vaccines- locally manufactured

- Anthrax (live)
- Hemorrhagic Septicemia (killed)
- Peste des Ruminants (PP) (live)
- Black Quarter (killed)
- Goat Pox Vaccine (live)

Poultry Vaccines & large and small animal vaccines- import

- Newcastle Disease Vaccine (live & Killed)
- Infectious Bursal Disease Vaccine (live & killed)
- Fowlpox Vaccine (live)
- Fowl Cholera Vaccine (killed)
- Egg Drop Syndrome Vaccine (killed)
- Marek's Vaccine (live)
- Infectious Bronchitis (live & killed)
- Avian Encephalomyelitis (live)
- Infectious Coryza (killed)
- Salmonella (killed)
- Mycoplasma (killed)
- Avian Influenza (AI) (killed)
- Foot and Mouth Disease (FMD) (killed)
- Rabies (live & killed)
- Mastitis (killed)

Figure 18: Overview of locally manufactured and imported poultry & large and small animal vaccines in Bangladesh

In terms of segmentation, RENATA Pharmaceuticals is the largest player in Bangladesh in the animal health segment, with a 22% market share. Other players active players are ACI (12%), ACME (10-12%), Square (7-8%), Elanco (7-8%), SK-F (7-8%) and Opsonin and Popular.

A commonly problem faced with pharmaceuticals being imported in Bangladesh is the insufficient testing capacity. Bangladesh only has one testing laboratory in the port which is a bottleneck. Products can be stored for free during the first 7 days. After that, importing players are required to pay a charge of USD 35 per day/per container, which is considered as substantial.[24]

According to the Bangladesh Veterinary Practitioners Ordinance, only registered veterinarians are allowed to prescribe medicine or to perform surgery. In the field, three segments of veterinarians are practising: (1) feed company veterinarians, (2) pharmaceutical company veterinarians ('technical officers') and (3) government authorized veterinarians. However, not only registered veterinarians but also non-veterinarian personnel and farmers use antimicrobials without a confirmatory diagnosis. Antibiotics are indiscriminately used in poultry diet, both for broiler and layer, as growth promoters and to control infectious diseases. Commonly used antibiotics are aminoglycosides, tetracyclines, beta-lactams, quinolones, macrolides, polypeptides, amphenicols and sulfa drug. Particularly smallholders and medium-size farmers believe that they should include antibiotics within their daily operations without consulting the relevant experts (veterinarians), making them unaware of application practices, effects and quantities to use. Feeding poultry with high quantities of antibiotics could result in

23 Source: Directorate General of Drug Administration, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh (2018) Guidelines on Animal Vaccine https://dgda.gov.bd/images/Draft_Animal_Vaccine_Guidelines.pdf

24 Source: Larive-LightCastle (2019).

antibiotic-resistant bacteria amongst others. Additionally, the majority of the farmers do not use finisher feed required to maintain the withdrawal period of antibiotics which leads to (high levels of) residuals of chemicals in the poultry meat. Even at the day of harvest or at wet markets, live birds are still treated with antibiotics and fed with grow-out feed. Human health can either be affected directly through residues in meat, which may cause residual side effects of antibiotics in human health, or indirectly, through antibiotic resistance bacteria spread by animals to humans, posing serious health threats.[25]

2.5.10 Middlemen and price setting

Credit plays an important role within the poultry sector in Bangladesh. Middlemen sell DOC, DOL and feed to broiler and layer farmers on credit. Feed is usually sold on 30-35 days of credit (single cycle). Dealers get discount prices at feed manufacturers and they have strong negotiation power over the feed price towards farmers.

25 Source: Ferdous J, Sachi S, Al Noman Z, Hussani SMAK, Sarker YA, Sikder MH (2019) Assessing farmers' perspective on antibiotic usage and management practices in small-scale layer farmsof Mymensingh district, Bangladesh, Veterinary World, 12(9): 1441-1447.

3. Regional opportunities

Broiler farms and layer farms are centralized in regional production hubs of which several are located across the country.

Table 9 illustrates the estimated number of registered broiler, layer and duck farms in Bangladesh, alongside their share in the total number of farms of that type. The four regions that host the largest concentrations of broiler farms are Dhaka, Khulna, Rajshahi and Chittagong. A similar distribution can be found for the layer industry.

Figure 19 visualizes the geographical distribution. The figure is complemented with the identification of regional poultry hubs, marked with gold circles. In these hubs, a large number of farms are located, often in the proximity to end markets (i.e. urban areas).

Table 9: Number of farms by district separately for broiler, layer and duck farms (Bangladesh Livestock Research Institute, 2014).[26]

Province	#broiler farms	%	#layer farms	%	#duck farms	%	total by region	%
Dhaka	14,573	27.4	5,817	31.9	2,639	40.3	23,029	29.6
Rajshahi	9,771	18.4	3,567	19.6	1,194	18.2	14,532	18.7
Rangpur	3,097	5.8	1,671	9.2	333	5.1	5,101	6.5
Khulna	11,944	22.5	4,208	23.1	342	5.2	16,494	21.2
Chittagong	7,819	14.7	1,685	9.2	258	3.9	9,762	12.5
Sylhet	1,761	3.3	103	0.6	1,151	17.6	3,015	3.9
Barisal	4,147	7.8	1,171	6.4	629	9.6	5,947	7.6
Total	53,112	100	18,222	100	6,546	100	77,880	100

Sonali farming is concentrated around Dhaka and in the Western and Northern districts. Sonali DOC are primarily reared in Bogra, Joypurhaat, Nator and in close proximity to the city of Rajshahi. In Bogra, more than 100 Sonali hatcheries are located, representing almost 70% of total Sonali production in Bangladesh. The Desi chicken is being reared across the entire country, which takes place primarily in small flocks in backyards of smallholder farmers.

26 Source: Annual Report 2014, Bangladesh Livestock Research Institute

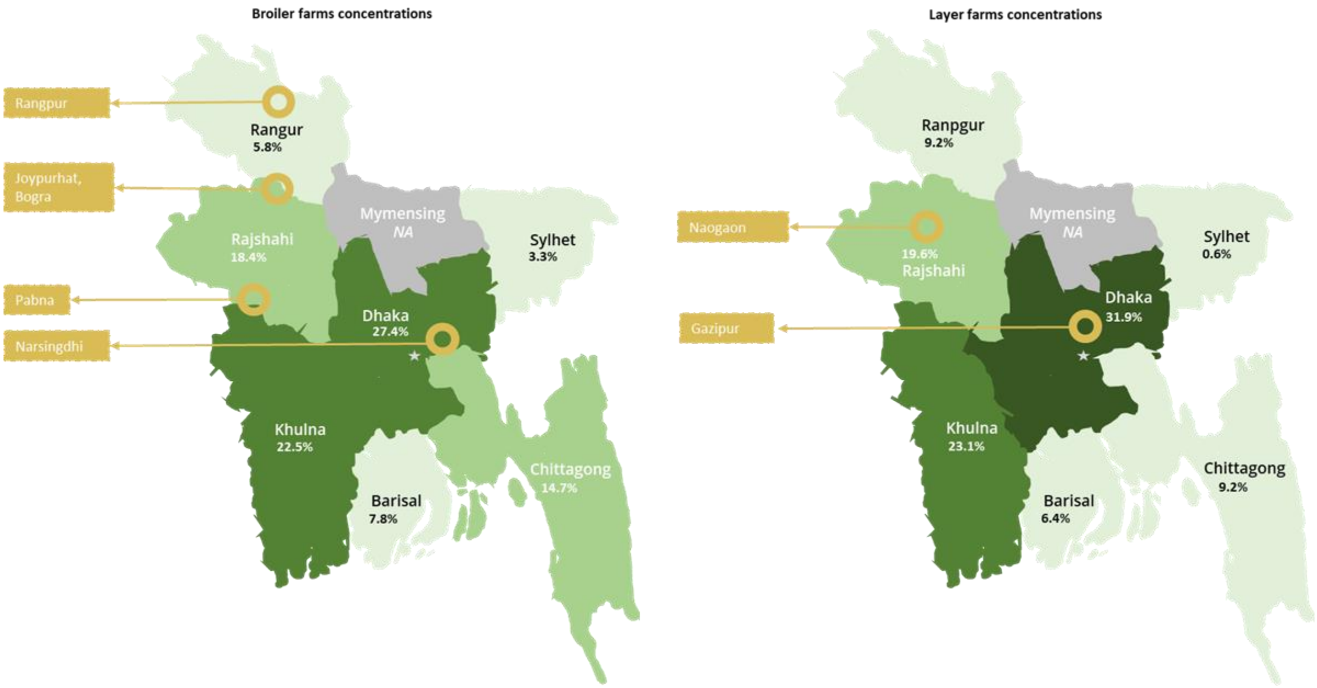


Figure 19: Number of broiler/layer farms as a share of total farms (%), by province and location of poultry production hubs (Larive-LightCastle, 2019).

4. Regulatory environment Bangladesh

4.1 Doing business in Bangladesh

According to World Bank's ratings, Bangladesh's rank on the *'Ease of Doing Business'* scale improved from 176 in 2018 to 168 in 2019. This development among others reflects the efforts exerted by the BIDA to attract foreign investment.

To facilitate more FDI inflow, the Bangladeshi government offers liberal investment and business operation policies. Interests of foreign investors are well-protected and investors are eligible for tax exemption or a reduced tax rate, depending on the business activities they undertake. The import duties in place and policies regarding documentation furthermore encourage foreign investment. One of the initiatives to attract FDI is the establishment of the One Stop Service (OSS) that has been developed by the BIDA. The service is attractive for foreign investors as it:

- reduces waiting time up to 45 days, depending on the type of services;
- ensures issuance and renewal of visa in 7 days;
- provides company registration-related services in 1-7 days;
- provides land registration and mutation services in 1- 28 days;
- provides environmental clearance service in 7-45 days;
- provides fire license in 15-20 days;
- gives investors land acquisition-related services in 90 days;
- gives investors gas connections in 30 days and electricity connection in 5-10 days.

The Registrar of Joint Stock Companies and Firms (RJSC) through this platform offers two services: *'name clearance'* and *'company registration'*. Moreover, the National Board of Revenue (NBR) and state-owned Sonali Bank utilize this platform by issuing Taxpayer Identification Number (TIN), and online payment processing facilities to companies, respectively. Besides, the National Board of Revenue (NBR) cooperates with the BIDA to influence policy reforms such as:

- reducing corporate tax audits;
- automating the submission of tax returns;
- simplifying and expediting VAT refund process;
- building awareness on new VAT acts;
- circulating the tax administration and law manual with a clear explanation of rules and guidelines on tax audits.

4.2 Policy framework

4.2.1 Legal framework overview

- In Bangladesh, a slaughter act has been in effect since 2011, which defines rules, regulations, and restrictions for slaughter. However, actors active in the poultry sector are insufficiently aware of the act, which is furthermore not enforced by the government adequately.
- The Bangladesh National Parliament launched the Food Safety Act 2013 to fight threats related to food safety. The act came into effect in February 2015. It defines coordination mechanisms between different public authorities and establishes basic definitions, goals and principles for food safety. The act has given the Bangladesh Food Safety Authority (BFSA) regulatory control over food safety and food quality. The three main tasks the BSFA is ought to fulfil are supervising, risk management and risk communication. The legal framework applies to domestically produced products as well as imported and exported products.

- The *'Animal Disease Rules'* act and the *'Bangladesh Avian Influenza Compensation Strategy and Guidelines'* exist to combat avian diseases and compensate farmers in case of a disease outbreak.

4.2.2 Doing business in Bangladesh from a foreign perspective

In Bangladesh, 100% foreign equity is allowed (except for defence machinery, nuclear energy, currency and forest plantations). Foreign investors are able to invest in domestic bourse without restrictions. Regulations applicable to FDI and other potential benefits offer numerous opportunities and are outlined below:

- Foreign investors can fully repatriate profits and dividends.
- Reinvestment of profits is considered as a new investment, making these investments again eligible for investment benefits.
- Provided approval of the company's board and execution of an independent valuation conducted by the Bangladesh Bank, international investors can cash out from investments.
- A company is not required to pay tax for expatriates that work for the company in Bangladesh for up to 3 years.
- Foreign investors are eligible to receive multiple-entry VISAs which are valid for up to 3 years.
- Expatriates employed in Bangladesh are allowed to remit up to 50 percent of their salaries and are eligible for repairable gratuity and retirement benefits.
- Foreign investors receive preferential treatments upon investing in Special Economic Zones (SEZs).
- Investing in SEZs allows for enjoying tax holidays up to 7 years. Investments in certain sectors, such as power, extends tax holidays up to 15 years.

Some benefits apply directly to investing in the agri-business sector:[27]

- Electricity consumption in the agro-processing sector is subject to rebates of 20%.
- Tariff-free access to the European Union.
- Cash incentives and export subsidies apply to selected export products and range from 5% to 20%.
- The government of Bangladesh aims to disburse loans in the agricultural sector of USD 2 BN.
- The Equity and Entrepreneurship Fund (EEF) can be applied for by those investing in the agri-business sector.

4.2.3 Domestic tax regulation

The Bangladeshi government allows foreign investors to enjoy five to seven years of tax exemption in certain sectors. Some sectors, such as power, enjoy tax exemption up to fifteen years. The following tax rates apply for the livestock sector:

- Revenues up to BDT 1,000,000 (EUR 10,600): 3%
- Revenues between BDT 1,000,000 and BDT 2,000,000 (EUR 20,100): 10%
- From 2,000,000: 5%

4.2.4 Trade duties applicable to local players and exporters to Bangladesh

Annex 6 reports the import and export duties that apply for different HS codes from both a local perspective and from a cross-country trade perspective.[28] Key findings include:

- Apart from DOC, a 25% custom duty applies to the import of live fowls and meat.

27 Source: Bangladesh Investment Development Authority (BIDA). Accessible at: http://bida.gov.bd/

28 Source: Bangladesh Customs and National Board of Revenue

- A 5% advance trade value-added tax (ATV) applies for all ingredients and poultry products, ingredients and machinery imported into Bangladesh. This tax adds on top of regular custom duties (CD), advance income taxes (AIT) and regulatory duties (RD) poultry entrepreneurs incur.
- A ban on export from Bangladesh applies to poultry products that originate from regions that have been affected by AI in the last three years.[29]

29 Source: Larive-LightCastle: Interview with FIAB (2019).

5. Key stakeholders Bangladesh poultry sector

5.1 Top private sector players

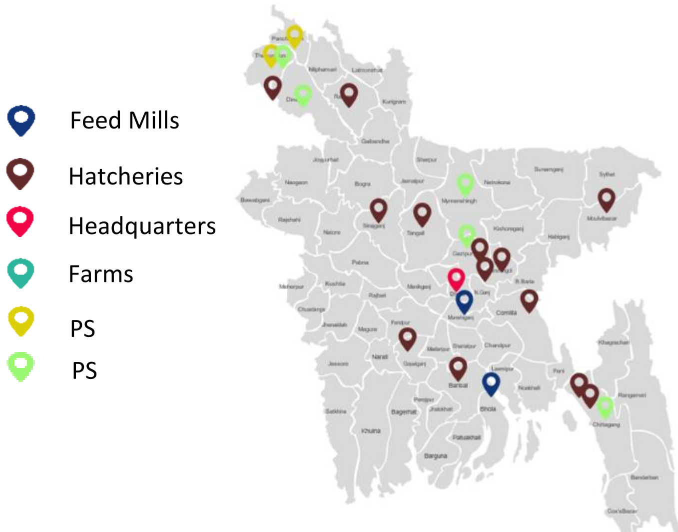
This section lists the main private players in the Bangladesh poultry industry, all being integrators. In Annex 2 more detailed information can be found.

Kazi

Website: www.kazifarms.com

Activities:

- GP Broiler: 49,000 GP (2018), operating 2 GP broiler farms
- PS broiler
- Slaughterhouse operation (10,000/day)
- PS layer farm
- Feed production

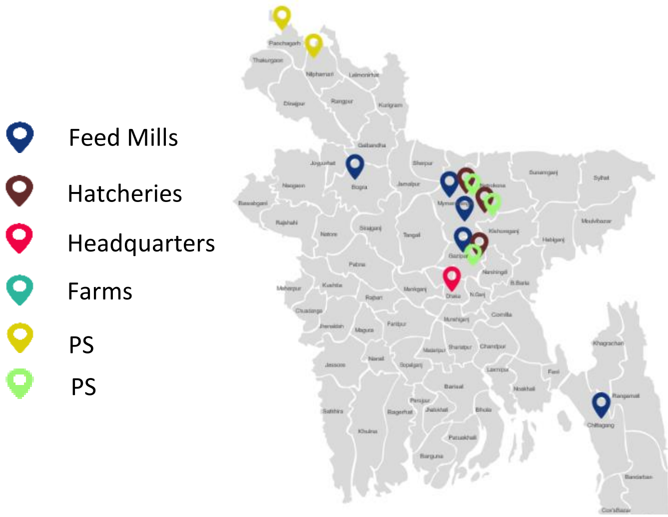


Nourish

Website: www.nourish-poultry.com

Activities:

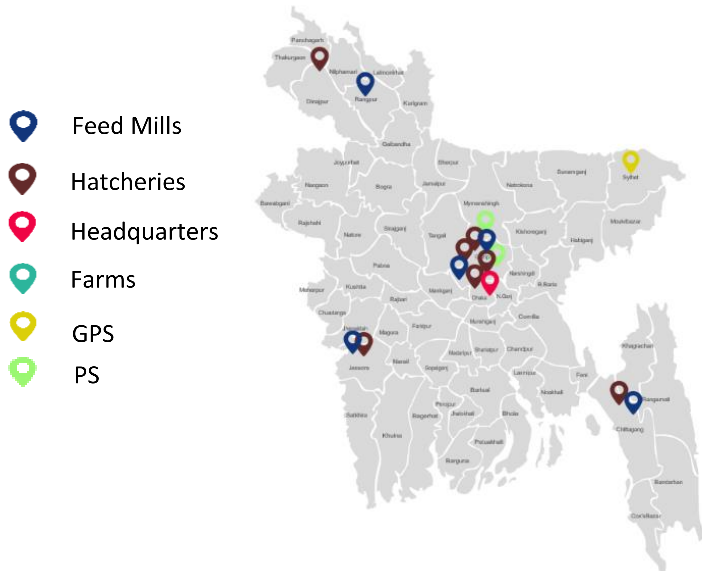
- Broiler: 22,500 GP (2018), operating 2 GP broiler farms.
- PS broiler
- Slaughterhouse operation (2,000/day)
- Feed production



Paragon (www.paragongroup-bd.com)

Activities:

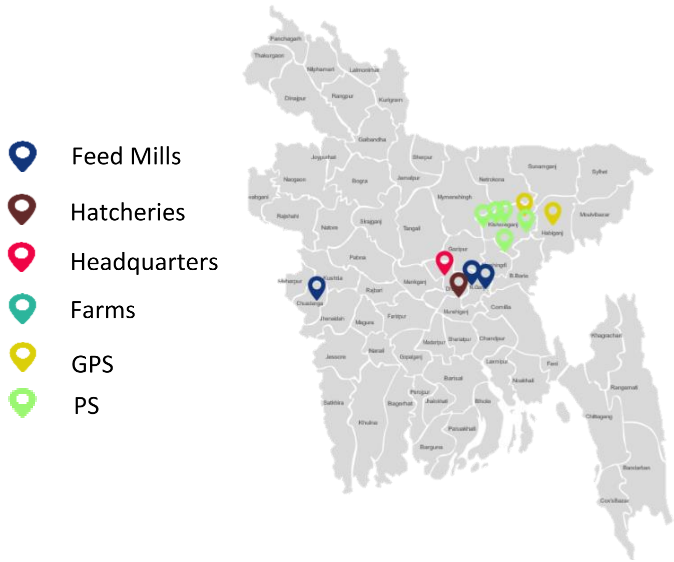
- Broiler: 14,000 GP (2018), operating 2 GP broiler farms.
- GP layer farm (sole company)
- PS broiler
- Slaughterhouse operation (5,000/day)
- PS layer farm
- Feed production



Aftab G.P. Ltd.
([www.aftabhatchery.com)](http://www.aftabhatchery.com)

Activities:

- Broiler: 12,000 GP (2018), operating 2 GP broiler farms.
- PS layer farm
- PS broiler
- Slaughterhouse operation (8,000/day)
- Feed production



Quality (www.qfl.com.bd)

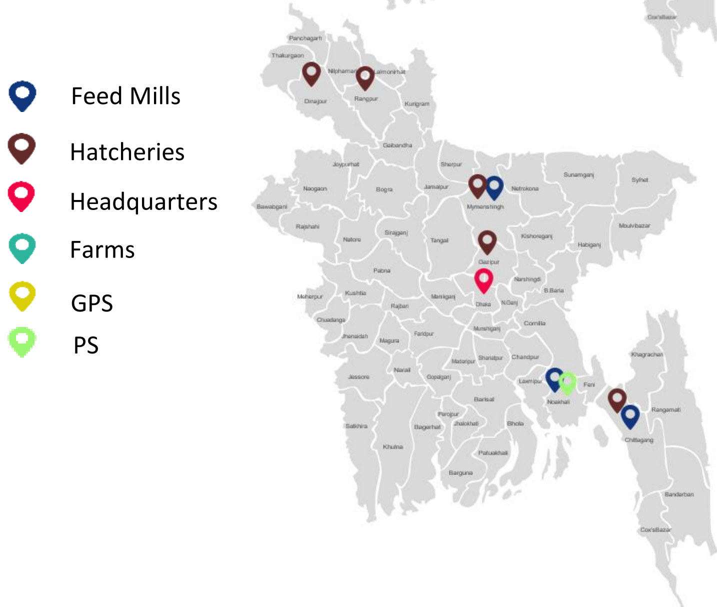
Activities:

- Hatchery and farming
- Feed production

Provita (www.provitagroupbd.com)

Activities:

- Hatchery and farming
- Feed



Geographical distribution of other large G.P. farms

C.P. (www.cpbangladesh.com)

Activities:

- Broiler: 24,000 GP (2018), operating 4 GP broiler farms.
- PS broiler
- Slaughterhouse operation (10,000/day)
- Feed production

Rashik / Zaman Group (www.zamangroup.com.bd/rashik-gp)

Activities:

- Broiler: 8,500 GP (2018), operating 1 GP broiler farm.
- PS broiler production

Kasila

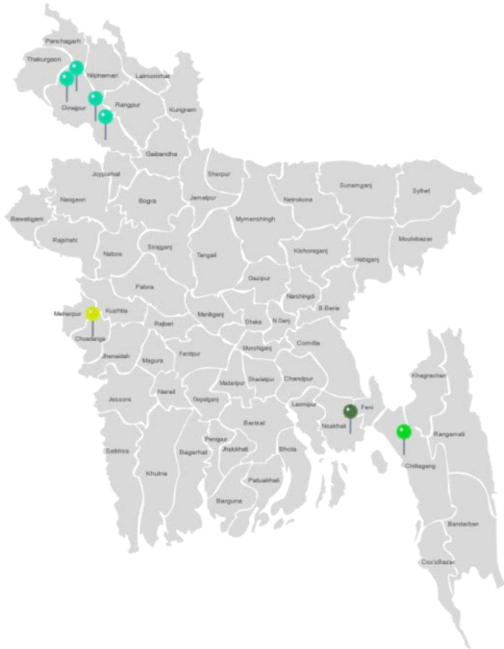
Activities:

- Broiler: 6,500 GP (2018), operating 1 GP broiler farm
- PS broiler production

A.G. G.P. (www.agagro.com)

Activities:

- Broiler: 5,800 GP (2018), operating 1 GP broiler farm (Aviagen)
- PS broiler production



C.P. Bangladesh Co. Ltd.

Kasila (Bangladesh) Limited (M.M. Agha).

Rashik GP Hatchery Ltd. (Zaman Group)

AG GP Ltd.

5.2 Public stakeholders

This section lists the main public stakeholders active in the Bangladesh poultry industry and elaborates on their activities. Annexes 7 and 8 provide accompanying information on the members of the Bangladesh Breeders Association and World's Poultry Science Members.

- **The Ministry of Fisheries and Livestock (MoFL)**'s role is ensuring sustainable utilization of fisheries and livestock.[30] The Department of Livestock is a branch of MoFL that supervises animal health and mitigates the spread of disease.
- **The Directorate General of Drug Administration (DGDA)** is a branch of the Ministry of Health & Family Welfare. Their primary responsibility is to act as the drug regulatory authority of the country. The DGDA supervises and implements prevailing drug regulations in Bangladesh. The DGDA furthermore regulates procurement of raw ingredients and packaging materials and the production, trade and sales of finished drugs.
- **The poultry department of the Bangladesh Rural Advancement Committee (BRAC)** started in 2003 as one of BRAC's social enterprises and was primarily involved in distributing DOC to rural farmers. After the 2007 AI outbreak, BRAC poultry expanded their target group and began to distribute DOC to 250 dealers around the country.[31] BRAC Poultry, among others, supports rural farmers by selling DOC at a lower price, giving them better value for money.
- **Breeders Association of Bangladesh (BAB)** was established in 2004. BAB trains farmers on safe and economic husbandry & management of commercial chicks and poultry birds. They collect data on breeding management and establish a principle on breeding management using data. The following parties are registered as members of the association: Nahar Agro Complex, Rafid Poultry & Hatchery, Aman Breeders, Bay Agro Industries, Bay Agro Industries, Nourish Poultry & Hatchery, Provita Hatchery, V.I.P. Shahadat Poultry & Hatchery, Peoples Poultry & Hatchery, Planet Agro, Planet Agro, Rashid Krishi Khamar, S.B. Hatcheries and M. M. Agha.
- **The Feed Industries Association of Bangladesh (FIAB)** was established in 2008 and is the only body for poultry, aqua and cattle feed manufacturers in Bangladesh. FIAB is a member of the Federation of the Chamber of Commerce and Industry (FBCCI). FIAB conducts compulsory tests of feed ingredients in labs before the products are being offered on the market. Their main objectives include monitoring, promoting safety measures, and protecting trading interests of poultry, aqua and cattle feed producers. FIAB furthermore collects data on feed manufacturing, which is being shared with the association's members. Besides, FIAB assists their association members with purchasing land and raising finance. The following parties are registered as members of FIAB; Quality Feeds, Aftab Feed Products, Aleya Feeds, Spectra Hexa Feeds, United Feed, Nourish Poultry & Hatchery, Padma Feed & Chicks, Bengal Feed & Fisheries, Bengal Feed & Fisheries, Paragon Poultry, Nahar Poultry, Agro-Industrial Trust (AIT), and Agata Feed Mills.
- **The Animal Health Companies Association of Bangladesh (AHCAB)** is the only body involved in promoting animal health of poultry, cattle, fish, shrimp. They advocate for sustainable animal industries. Besides, the association tries to ensure high-quality domestic protein supply through education and transferring appropriate technology.
- **The World's Poultry Science Association - Bangladesh Branch (WPSA-BB)**, started its operation in July 1997. The association provides information on the latest technologies in the

30 Source The Ministry of Fisheries and Livestock, Accessed on 24 Feb 2020, accessible on http://bit.ly/37W6ze1

31 Source: BRAC Poultry Rearing, accessed on 25 Feb 2020, accessible on http://bit.ly/2TdBoW3 poultry sector to farmers. They also conduct training for general poultry rearing and controlling avian diseases.

- **The Sher-e-Bangla Agricultural University** was established for the expansion of higher agricultural education. The university is committed to promoting research in various fields of agricultural sciences. Several research projects have been undertaken by different departments of the University.[32]
- **Bangladesh Agricultural University (BAU)** was established to improve the quality and standard of higher agricultural education. The university promotes good agricultural practices. Currently, the university produced 200+ research papers on agricultural practices in Bangladesh.[33]

32 Source: Sher-e-Bangla Agricultural University, accessed on 25 Feb 2020 Accessible on http://bit.ly/2uwNotC

33 Source Bangladesh Agricultural University accessed on 25 Feb 2020 Accessible on http://bit.ly/32rriW4

6. Bottlenecks poultry sector development

According to the Sher-e-Bangla Agricultural University, the poultry sector of Bangladesh receives too little development support for it to reach its full potential based on historic and forecasted production and consumption figures.[34] Currently, multiple bottlenecks constrain sector development, which indicate the need for private sector and governmental support. A number of bottlenecks are outlined in this chapter. Chapter 7 focuses on the opportunities arising from these bottlenecks and the current poultry sector status in Bangladesh.

6.1 Animal health & disease control

The Bangladeshi commercial poultry sector experienced rapid expansion over the last years, however, poultry diseases constrain further development and hamper the industry's productivity. During recent years, about 30% of the poultry flock in Bangladesh died annually due to several disease outbreaks. Many of these diseases also pose hazardous threats to human health. The occurrence of poultry diseases in an area depend on various factors such as the quality of monitoring of the bird population, management practices, geo-climatic conditions and immunization[35]. For instance, improper control over the volume of air, containing ammonia from chicken litter, is detrimental to the growth of birds.

The emerging diseases and unknown causes result in farmers' losses, high bird moralities and human health threats. To reduce the occurrence of diseases and improve poultry health, disease control and diagnostic laboratory (capacity and capabilities) are key. Bangladesh is characterized by poor service delivery in the form of veterinary, vaccination and disease control services.

The policy of the MoFL is to strive for sustainable rural development, improve food security & food safety and reduce the usage of antibiotics. To successfully execute this policy, good governance, transparency and communication are required. It is important to improve cooperation between ministries, including the veterinary diagnostic services, poultry farmer associations, private sector parties in the poultry sector, and universities of veterinary science. However, an integrated network to enable cooperation is lacking in the current Bangladeshi poultry sector. Also, farmers do not adhere to the standard to not feed their birds with antibiotics 7-10 days before slaughter.

Additionally, there is no nationwide systematic approach to collect and share data on poultry diseases (government, veterinarian and farmer level) in Bangladesh. As almost none of the carcasses are sent for post-mortem diagnosis, Bangladeshi stakeholders are often unaware of current diseases.

Bangladesh lacks veterinary diagnostic capacity, related to know-how, lab equipment and quality assurance systems of international stature. This results in limited testing of residuals in and contamination on meat and the quality of vaccines and medicines amongst others. To achieve more timely disease detection that will lead to more effective control, strengthening surveillance and enhance laboratory capacities is required.

Disease control protocols and measures are often non-existing at farms. Poultry farmers lack awareness about protocols for operations such as disinfection methods, water quality and litter management, all important to reduce the risk of animal diseases to spread. As a result of the poor

34 Source: Raha, S.K. (2014) Poultry Industry in Bangladesh: present and future potential.

https://www.academia.edu/32585710/Poultry_Industry_in_Bangladesh_Present_Status_and_Future_Potential

35 Source: Mamun, M.A., Islam, K. M., Rahman, M.M. (2019). Occurrence of poultry diseases at Kishoregonj district of Bangladesh. MedCare journal of Proteomics and Bioinformatics, 8(1).

animal health and disease control practices, farmers and veterinarians often use inadequate medication such as high levels of antibiotics, which results in substantial cost for farmers, potential resistance among flocks and vast risks for the human health population.

6.2 Feed formulation and feed mill efficiency

Feed milling is an essential step in the poultry value chain as feed roughly represent 70% of the total costs. Nutritious formulations and efficient production have an impact on feed mill and farm performances and thus on the sectors' profitability.

The small and midsized feed producers in Bangladesh lack knowledge on efficient feed production processes, nutrition & formulation, usage of premixes, additives and enzymes and storage. The relatively low-quality feed produced by this segment results in semi-optimal performances at farm level. Modern feed mill equipment is unavailable for small and medium-sized feed millers in Bangladesh. This results in poor feed mill performance and quality fluctuations. Additionally, contamination of poultry feed is a common practice, which worsens the quality of feed. Lower quality feeds do not only impair growth of animals, but also negatively affects consumer perceptions of locally bred birds.

There is a need to improve the knowledge level of Bangladeshi feed mill managers and examine their current production methods to identify opportunities for improvement. Moreover, modern feed mill equipment could significantly improve the practices and performances in the poultry feed sector.

6.3 Breeder & Hatchery management

An essential step in the poultry value chain is the hatching of broiler and layer eggs. Poultry farmers in Bangladesh face relatively high DOC prices at volatile prices, heavily influencing their financial performance. The dominant position of the breeding companies (due to their concentrated supply, which is sometimes being sold below production prices), also makes market entry for new players challenging. Especially the small and midsized players lack knowledge on breeder and hatchery management. Breeders and hatchery operators face challenges in terms of:

- Hatching egg quality;
- Storage and incubation conditions;
- Data analysis;
- Hatching egg transport;
- Managing fertility and uniformity;
- Optimal usage of hatching machinery and equipment;
- Post hatch performance.

6.4 Biosecurity

Proper farming practices are currently not assured in Bangladesh. Main reasons are the lack of rules and regulations and effective enforcement and lack of awareness amongst farmers and transport companies due to insufficient availability of information. Bangladeshi poultry farmers face relatively high mortality rates as a result of inappropriate farm management which includes receiving of DOC, feed, water and medication supply, hygiene standards, heating and ventilation, catching and transporting broilers and data management, to name a few.

The far majority of Bangladeshi broiler farm are open houses. Open houses are wooden built with bamboo slates, mostly with open water systems and non-optimal temperature conditions (with limited or no ventilation). Diseases spread more easily through open water systems, resulting in high mortality rates since sick animals tend to drink more frequently. To prevent the flock from getting infected, Bangladeshi broiler farmers use relatively high quantities of (largely unnecessary) antibiotics/chemicals, which can lead to resistance to animals and humans. Closed water systems are more hygienic, as they prevent diseases from spreading. However, there is a lack of knowledge and awareness on the importance of water hygiene and its effects on animal health amongst poultry farmers in Bangladesh.

Ventilation in a poultry house supplies fresh air which is essential for the bird's health and wellbeing. It also helps to reduce extremes in temperature, humidity and air contamination. Improved ventilation systems furthermore allow for a higher density of livestock populations, reducing the cost per bird housed. Climate conditions are especially of importance in the hot and humid season (April-September), not just to obtain better performance, but also to improve animal welfare. Proper heating is furthermore required, notably within the first days DOC arrive from the hatcheries.

In general, Bangladesh broiler farmers lack knowledge, solutions, technologies and services to enhance on-farm biosecurity, posing serious animal and human health risks.

6.5 Food safety

Every week, over 10 MN broilers are slaughtered in Bangladesh. Consumers indicate that they are willing to pay more for safe poultry meat. However, consumers' perception of food safety is not always correct. The majority of the consumers in Bangladesh believe that meat bought at wet markets is safer and contains fewer antibiotics. On the contrary, the increased millennial generation and young professional segment are advocating more and more for professionally processed chicken (ready-to-cook and ready-to-eat food products).

At the public level, there is insufficient awareness of the importance of food safety and proper slaughtering processes. There is no implemented structural surveillance, prevention and control on food safety and product quality. As a result, Bangladesh faces low levels of food safety (bacterial contaminations, zoonotic disease (salmonellosis), micro-organisms, high antibiotics residual exposure and reduced shelf lives).

Bangladesh lacks any form of organised professional downstream infrastructure (slaughtering, processing, cold storage, and transport), posing serious food safety risks. Some retailers do have cold storage, however, they turn the power off when leaving their shops. The lack of cold storage also constrains the further development of the poultry processing industry. This makes it harder for existing processors to extend their business outside the cities as they cannot assure cold transportation.

Improving slaughtering practices in Bangladesh requires an increase in the slaughter capacity (following international best practices, for example applied elsewhere in Asia). Additionally, existing facilities need to undergo improvements to adhere to international standards.

6.6 Access to finance

During the interviews Larive-LightCastle conducted, parties active in the poultry sector in Bangladesh indicated that the lack of finance is among the main bottlenecks for further development. Larger players such as integrated parties, which are sometimes part of larger industrial groups, have better access to finance. However, especially smaller companies or individual farmers struggle to comply with financial loan requirements. Moreover, farmers do not know where to invest in, and what is the return on investment and total costs of ownership. Farmers mostly gain information through their suppliers (feed, DOC, medication), which is often biased in favour of the suppliers and restrains farmers from investments in best farming practices.

Larive-LightCastle identified three existing programs/facilities for small and medium sized companies active in the Bangladeshi poultry value chain to (indirectly) gain access to finance:

1. In December 2018, the World Bank approved USD 500 MN (~EUR 460 MN) loan to Bangladesh to improve the livestock and dairy production. The credit from the World Bank's International Development Association (IDA) has a 30-year term including a five-year grace period and provides grants or zero-interest loans.[36]
2. In response to the impacts of the COVID-19 pandemic, the Bangladesh government has finalized a loan package amounting to BDT 50 BN (~EUR 540 MN) to support the agriculture and livestock sectors of the county. The loans will be distributed through commercial banks at a five percent interest rate (almost half of the usual rate of nine percent) to crop growers, poultry farmers, dairy farmers and fish farmers.[37]
3. The Bangladesh Krishi Bank (BKB) has introduced a new program titled "Beef Fattening" to create self-employment for the poor and unemployed people of the country. Additionally, the bank is providing continuous loan for processing, preservation and marketing of agricultural products. Furthermore, the BKB offers credit facilities both for production and marketing of different agricultural equipment and farm machinery including irrigation equipment.[38]

In addition, aggregating actors (for example via establishing new cooperatives and/or strengthening existing forms of partnerships) would allow for increased buying power and make these organizations more attractive for debt financing.

Via Dutch private & (semi-) government institutions, funding instruments have been made available in order to stimulate international business development activities. Dutch companies with the ambition to do business in high-growth countries such as Bangladesh are able to apply for different types of credit programs/facilities. Dutch suppliers of capital goods could leverage these Dutch instruments, increasing the attractiveness of exporting equipment from the Netherlands to Bangladesh. The three main financing programs and institutes are Atradius, DGGF and FMO. Detailed information on the programs and institutes, the requirements and investment sizes can be found in Annex 9.

- **Atradius: Insurance applications (project finance and export)**
  Atradius Dutch State Business N.V. is the official export credit facility on behalf of the Dutch State. It is their goal to promote Dutch exports and investments abroad by providing export credit insurance (ECI) complementary to that available in the private sector. It is therefore principally intended for transactions which are difficult or impossible to insure in the private credit insurance market due to their long credit period, large size or the country risk involved.
- **DGGF: Export credit insurance as finance (via Atradius)**
  DGGF is focused on stimulating development relevant export to selected low and middle-income countries (including Bangladesh) by Dutch SME's. It involves risky transactions in which banks are not able or willing to provide financing without export credit insurance (ECI).
- **FMO: Dutch Entrepreneurial Development Bank**

36 *Source:* https://www.worldbank.org/en/news/press-release/2018/12/06/world-bank-lends-500-million-to-bangladesh-for-dairy-livestock-productivity

37 *Source:* https://www.newagebd.net/article/104252/tk-5000cr-loan-package-offered-for-agriculture

https://thefinancialexpress.com.bd/national/experts-welcome-agri-stimulus-stress-on-proper-distribution-1586698431

38 *Source:* http://www.krishibank.org.bd/

FMO is a Dutch development bank structured as a bilateral private-sector international financial institution based in the Hague, the Netherlands. FMO manages funds for the Ministries of Foreign Affairs and Economic Affairs of the Dutch government to maximize the development impact of private sector investments. It is licensed as a bank and supervised by the Dutch Central Bank. FMO helps Dutch businesses to realize their ambitions and create positive impact in developing and emerging countries. FMO crafts financing solutions to support commercially viable businesses and strategic government projects that contribute to the Sustainable Development Goals.

6.7 Sector-specific training and education

Poultry, despite its importance, has been a neglected area of agricultural research in Bangladesh. No visible improvements can be made due to the absence of a sense of urgency and low investment in research. Scientific research studies relating to economic aspects of the poultry sector are not adequately available. Moreover, due to a lack of effectiveness in its research and extension services, it has not yet been demonstrated that livestock farming can be transformed into an attractive and profitable business. The two main agricultural universities in Bangladesh, Sher-e-Bangla Agriculture University (SAU) and Bangladesh Agricultural University (BAU) do not offer poultry specific education. Also, practical training and education regarding poultry farming is lacking in Bangladesh. Farmers gain their knowledge mainly from input suppliers and by trial-and-error.

6.8 Enforcement rules and regulations

One factor occurring in most of the above-mentioned bottlenecks is the lack of enforcement of rules and regulations in the Bangladeshi poultry sector. Although formally in place, the lack of capacity to enforce and control result in low levels of biosecurity, poor animal health conditions, excessive use of antibiotics and mistrust among consumers with respect to food safety.

Strengthening enforcement and control in the Bangladeshi livestock sector would require a Government-led top-down approach, in order to increase awareness, knowledge and capabilities among government employees, (field) veterinarians, epidemiologists, lab staff and lab technicians on poultry health, epidemiology and poultry disease surveillance, monitoring and control programs for the most important poultry diseases (such as HP-AI, NDV and Pasteurellosis). In addition, the laboratory network should be strengthened and a nationwide diagnostic veterinary system should be developed, allowing to operate according to international regulations on Lab Quality Systems (ISO17025).

7. Sector development opportunities

Based upon the poultry sector insights, a SWOT analysis is conducted to identify development opportunities within the poultry sector in Bangladesh. The analysis is displayed in Figure 20 and offers guidance to Dutch and Bangladeshi parties considering investments in/entering/expanding their activities in the poultry sector in Bangladesh. The current macro-economic conditions and consumer preferences in Bangladesh are in favour of poultry sector development. Poultry sector weaknesses, constraining sector development, are derived from the bottlenecks, obtained during the performed interviews, as listed in Chapter 6. Common threats, as examined in the SWOT, need to be taken into account when doing business in the poultry sector in Bangladesh. Most importantly, the SWOT reveals lots of business opportunities to be present.

Strengths	Weaknesses
➢ Sizeable population (167 MN in 2019). ➢ Robust macroeconomic fundamentals. ➢ Stable government. ➢ Advantageous incentives to stimulate (FDI). ➢ Poultry meat and eggs are widely accepted protein sources by all cultures and religions in Bangladesh.	➢ Underdeveloped physical infrastructure (ports, roads, power). ➢ Lack of transparency, burdensome and slow bureaucratic processes and institutionalised corruption. ➢ Underdeveloped financial sector. ➢ The country's vulnerability to natural disasters (landslides, cyclones, floods, earthquakes etc.). ➢ Inadequately diversified exports, being dependent on the textile sector. ➢ Poor animal health practices, lack of disease control measures and food safety law enforcement. ➢ Substantial underinvestment, lack of knowledge and inefficiencies in all segments of the poultry value chain. ➢ Current consumer preference for 'warm chicken' (wet market).
Opportunities	**Threats**
➢ Growing per capita poultry meat and egg consumption. ➢ Gradual arrival of international fast food chains demanding high quality and traceable locally processed poultry meat, requiring availability of production capacity and standards of international level. ➢ First mover advantage for various kinds of products and services in the poultry value chain and related industries. ➢ Availability of low-cost labour. ➢ Strategic position to supply North East India (so called 'seven sister States': Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura).	➢ Disease outbreaks. ➢ High debt burden amongst domestic poultry players make the sector vulnerable for market fluctuations. ➢ Increase in interest (credit dependency). ➢ Competition of Asian players who offer cheaper, lower-quality equipment and solutions for the Bangladeshi poultry sector.

Figure 20: SWOT analysis poultry sector Bangladesh (Larive-LightCastle, 2020).

Further development of the sector can be established through the implementation of:

- ➢ Public-Private Projects (PPPs) focusing on tackling the most pressing issues in the Bangladeshi poultry sector. These projects would include Dutch and Bangladeshi public and private stakeholders, having mutual project goals.
- ➢ Business-to-Business opportunities, in which Dutch private sector parties supply products, services, solutions and experiences to the poultry sector in Bangladesh. Sales of modern, mid/high-tech poultry sector solutions will enhance private sector development.
- ➢ Government-to-Government projects to support public actors active in the poultry sector in Bangladesh with strengthening their capabilities.
- ➢ Knowledge-to-Knowledge projects focusing on knowledge sharing and the implementation of best practices.

Given the finding that smallholder farmers account for the majority of farmers in the poultry value chain, there may be additional pathways to support smallholder farm development. A possible way to forward smallholder farmers is to organize smallholder farmers into cooperatives or farm aggregations, which can offer incentive-based schemes that stimulate take-up of improved farming practices, facilitate knowledge transfer among local smallholder farmers and offer more sales and procurement stability.

A cooperative organizational format could offer significant benefits for its members/shareholders, as it is stronger positioned in the market than individual smallholder farmers. Advantages could include 1) the opportunity to procure high-quality DOC, feed and medication in larger quantities , 2) improving access to finance, and 3) bulk sales of poultry products (i.e. better negotiation position towards off-takers). By being better able to deal with local traders, centralizing farmers' commercial operations improves financial resilience and allow smallholder farmers to better withstand disruptive market behaviour. Due to its strong connectivity in local markets, the cooperative/farmer aggregation can also facilitate the take-up of services such as veterinary advice, stimulate (female) entrepreneurship and improve working conditions. Larive-LightCastle recognizes that encouraging the development of cooperative programs is possibly an effective way to forward and professionalize smallholder farmers.

7.1 Public-Private Project opportunities

Given the current level of development of the Bangladesh poultry sector, its relatively modest size (in comparison to other Asian markets) and the lack of experience of Dutch parties in this geography, entering the market as a consortium could offer advantages. Consortia offer the possibility to enter/develop the market with integrated solutions covering the entire poultry value chain while mitigating risks by leveraging the experiences and relations of the parties involved. Public-Private Partnerships (PPP) in the poultry sectors have proven to be successful in other Asian countries. The goal of a PPP would be to develop and strengthen the poultry sector in Bangladesh by providing training and demonstrating best practices particularly while increasing investments in the sector by offering localised solutions. Based on the SWOT, several fields within the Bangladesh poultry sector could be addressed particularly, including:

1. Improving poultry health & disease control.
2. Improving feed formulation and increase feed mill efficiency.
3. Strengthening the capabilities of breeding farms and hatcheries.
4. Improving poultry farm management (focusing on biosecurity).
5. Food safety (particularly in the downstream segment).

More details about the purpose, envisioned activities, specific focus, envisioned results and potential Dutch consortium members which could add value within these field of improvement can be found in Annex 10. The Bangladeshi players listed in Annex 2-5 and mentioned in Chapter 5 might be considered as counterparts to implement activities.

7.2 Business-to-Business opportunities

The current population growth, urbanization, consumption patterns and economic situation in Bangladesh pose favourable conditions for FDI and exports from the Netherlands. During the interviews, sector experts indicated that local actors consider investments in various steps of the Bangladesh poultry value chain. All parties, from integrators and larger independent farmers, breeders, feed millers, processors and retailers, all have the ambition to expand their businesses. These expansions will be focused on more efficient solutions to keep up with the increasing demand and improving the competitive position of the local sector.[39] For Dutch private sector players, these

39 Source: Larive-LightCastle (2020).

investment plans offer opportunities and they might contact the companies listed in Annex 2-5 for further details. Agricultural and poultry expo's and fairs also offer great possibilities to explore and utilize business-to-business opportunities, though current circumstances pose for some uncertainties. Originally, the following expo's and fairs were scheduled for 2020:

- 2-4 July 2020: Dairy and Poultry Expo, Dhaka, Bangladesh;[40]
- 2-4 July 2020: FeedTech Bangladesh, Dhaka, Bangladesh;[41]
- 19-22 Augustus 2020: Poultry & Livestock Bangladesh International Expo, Dhaka, Bangladesh.[42]

Dutch private sector players could furthermore approach local poultry equipment vendors, as listed in Annex 4, to support the import and distribution of their products and services in Bangladesh.

The Netherlands is internationally renowned for its sustainable and well-developed poultry sector. The Dutch poultry sector employs over 22,000 people in the entire poultry value chain. In 2019, the Netherlands counted 875 broiler farms housing 380 MN broilers. Local production in 2019 was 1.1 MN ton of broiler meat, coming from 760,000 MT in the year 2000. The Dutch layer sector counted 867 farms housing 33.4 MN layers in 2019. In 2019, 10.5 BN eggs have been produced in the Netherlands. The per capita consumption of eggs in the Netherlands is over 200.

Besides these impressive production figures, the Netherlands is considered as a world-leading country in terms of feed, poultry health, antibiotic reduction, food safety, biosecurity and environmental-friendly solutions. The Netherlands hosts numerous large, international operating, companies covering various parts of the poultry value chain. Some of these companies are even internationally active for over 100 years, making them experts in offering products and solutions especially adjusted to local circumstances. As such, Dutch companies could play a role in strengthening the development of the Bangladeshi poultry sector.

An overview of Dutch poultry sector companies which are internationally active and of potential interest to Bangladeshi poultry sector players could be found in Annex 11. This Annex also includes a column indicating which companies are already active in Bangladesh.

Business-to-Business opportunities: Broiler segment

Larive-LightCastle estimates that the total demand for poultry meat will increase with approximately 34% within the next five years, based upon estimated increase in consumption (26%- with a CARG of 3.1%) in combination with estimated population growth (6% - with a CARG of 1.2%, the population in Bangladesh is expected to reach 177 MN by 2025).

An estimated increase of the total demand for poultry meat with approximately 34% within the next five years calls for substantial expansions in domestic breeding, feed milling, farming, processing and cold chain capacities. The amount of broilers (at current 525 MN) will increase to 700 MN in 2025. This suggests to the following expansions in the Bangladesh broiler sector till 2025:

- Breeding & hatching: On average, a PS bird produces 125 DOCs/year. As such, the estimated 175 MN increase in broilers in the next five years represent the need for approximately 1.3-

40 Source: *https://10times.com/dairy-poultry-expo-dhaka*

41 Source: *https://10times.com/feed-tech-bangladesh*

42 Source: *https://cems-poultrylivestock.com/*

1.5 MN additional broiler PS. Bangladesh currently counts 175 formal and informal breeding farms hosting 4.2 MN PS. As an average breeding farm in Bangladesh houses 24,000 birds, this would result in the need for 50-70 additional breeding farms (not taking into account expansion of existing breeding farms, increase in productivity or imports). Besides the need for increased breeding farm capacities, Bangladesh also experiences the shift towards more 'controlled environments' in breeding houses and hatcheries. This suggests a potential for Dutch companies supplying expansion as well as productivity-increasing breeding house and hatchery equipment.

- Feed: Average broiler feed intake accounts for 2.5 kg per broiler. As such, the estimated 175 MN increase in broilers in the next five years represent an increase of 400,000 – 500,000 MT broiler feed. At current, Bangladeshi feed millers operate relatively low-tech equipment, primarily sourced from China. In order to meet increasing domestic demand and remain competitive, there will be increasing opportunities for Dutch suppliers of feed mill equipment, complete feed, feed specialities (premixes, additives) and feed ingredients.

- Processing: The processing rate in Bangladesh (share of birds being processed at a modern slaughterhouse) is currently only 3% (16 MN out of 525 MN broilers). It is likely that this share will increase within the coming five years to approximately 10% due to growing consumer awareness, the (public) ambition to diminish wet market slaughtering (fuelled by amongst other by the current COVID-19 pandemic) and further expansion of quick serving restaurants (applying international food safety standards). In combination with the estimated increase in demand, Larive-LightCastle estimates that the number of broilers slaughtered in modern slaughterhouses in Bangladesh will grow from 16 MN (2019) to 70 MN in 2025. This increase of 50-60 MN broilers slaughtered per year in modern slaughterhouses, would require approximately 6 – 8 midsized slaughterhouses (25,000 birds/day). The Netherlands is home to a number of slaughtering and processing equipment suppliers, for which Bangladesh might offer good business opportunities.

Table 10 provides an overview of the estimated capacity expansions in the Bangladeshi poultry meat sector required to comply with the forecasted demand in 2025.

Table 10: Estimated capacity expansions till 2025 broiler sector Bangladesh (Larive-LightCastle,2020)

Estimated capacity expansions in the broiler segment till 2025	Volumes	Anticipated investments in the broiler segment till 2025
Breeding & hatching	➢ 1.3 – 1.5 MN broiler PS (approximately 50-70 additional broiler breeder farms). ➢ 175 MN DOC (approximately 6-8 additional hatcheries).	➢ EUR 4 – 6 MN investment in breeder farm housing equipment. ➢ EUR 10 – 15 MN investment in hatchery equipment.
Feed	➢ 0.4 – 0.5 MN MT feed production (approximately 3-5 additional midsized feed mills 20-40 MT/h capacity).	➢ EUR 25 – 40 MN investment in feed milling equipment value.
Housing	➢ 175 MN broilers.	➢ EUR 25 – 40 MN investment in broiler housing equipment.

Processing	➢ 70 MN broilers (approximately 8-10 additional midsized slaughterhouses of 25,000 birds/day capacity).	➢ EUR 5 – 15 MN investment in slaughtering and cold storage equipment.

Business-to-Business opportunities: Layer segment

Larive-LightCastle estimates that the total demand for eggs will increase with approximately 49% within the next five years, based upon estimated increase in consumption (41%- with a CARG of 4.5%) in combination with estimated population growth (6% - with a CARG of 1.2%).

An estimated increase of the total demand for eggs with approximately 49% within the next five years calls for substantial expansions in domestic breeding, feed milling, farming, and egg handling & transporting capacities. The amount of layers (at current 74 MN) will increase to 110 MN in 2025. This suggests to the following expansions in the Bangladesh layer sector till 2025:

- Breeding & hatching: On average, a layer PS bird produces 190 DOLs/year. The estimated increase of 36 MN in layer population in the next five years represents the need for approximately 185,000 – 195,000 additional layer PS. Bangladesh currently counts 125 formal and informal layer breeding farms hosting 389,000 PS. As an average layer breeding farm houses 3,000 birds this would result in the need for 60-65 additional breeding farms (not taking into account expansion of existing breeding farms, increase in productivity or imports).

- Feed: Average layer feed intake per bird is 35 kg per year. As such, the estimated 36 MN increase in layers in the next five years represent an increase of 1.2- 1.3 MN MT layer feed. At current, 50% of Bangladeshi layers are fed with commercial feed. As such, the estimated increase in layer population results in an increase of 600,000 – 700,000 MT commercial layer feed demand. Currently, feed millers operate relatively low-tech equipment, primarily sourced from China. In order to meet increasing domestic demand and remain competitive, there will be increasing opportunities for Dutch suppliers of feed mill equipment, complete feed, feed specialities (premixes, additives) and feed ingredients.

- Egg handling: The current 74 MN layer and Sonali birds produce 15.5 BN eggs, given an on average of 210 eggs/bird/year. The estimated increase of 36 MN in layers in the next five year represent an additional production of 7.6 BN eggs. This increase requires investments in egg handling and transporting capacities.

Table 11 provides an overview of the estimated capacity expansions in the Bangladeshi poultry layer sector required to comply with the forecasted demand in 2025.

Table 11: Estimated capacity expansions till 2025 layer sector Bangladesh (Larive-LightCastle,2020)

Estimated capacity expansions in the layer segment till 2025	Volumes	Anticipated investments in the layer segment till 2025
Breeding & hatching	➢ 185,000 – 195,000 layer PS (approximately 60-65 additional layer breeder farms). ➢ 36 MN DOL (approximately 1-2 additional hatcheries)	➢ EUR 0.5 – 1.0 MN investment in breeder farm housing equipment. ➢ EUR 3 – 5 MN investment in hatchery equipment.
Feed	➢ 0.6 – 0.7 MN MT feed production (approximately 4-6 additional midsized feed mills 20-40 MT/h capacity).	➢ EUR 30 – 50 MN investment in feed milling equipment value.

Housing	➢ 36 MN layers	➢ EUR 30 – 50 MN investment in layer housing equipment.
Egg handling	➢ 7.6 BN eggs	➢ EUR 3 – 5 MN investment in egg handling & grading equipment.

The estimated capacity expansions and anticipated investments in both the poultry meat and layer segments suggest significant Dutch-Bangladeshi Business-to-Business opportunities.

7.3 Government-to-Government opportunities

Dutch governmental organizations, such as the Dutch Food Safety Authority ('NVWA') and the Dutch Ministry of Agriculture, Nature and Food Quality, possess an abundance of knowledge on food and animal safety, biosecurity, veterinary practices, food circulation and how to limit the impact of poultry farming on the environment. At current, local governments in Bangladesh do not fully implement proper guidelines as to what actions to take upon disease outbreaks, how to improve biosecurity, how to increase the vaccination rate of farms and how to ensure food and animal safety. The Bangladesh Government and public institutes could learn from Dutch experiences. This enriches regulatory bodies in Bangladesh with effective regulations that improve poultry practice safety and furthermore offer handles to respond adequately in case of disease outbreaks and materialization of other sector related risks. Therefore, it is recommended that workshops are organized where government delegates interact to share knowledge and execute reviews on Bangladesh poultry regulations.

7.4 Knowledge-to-Knowledge opportunities

The opportunities to stimulate knowledge transfer include: 1) cross country curriculum development, and 2) the development of selective training programs.

Cross-country curriculum development

Employing well-trained human resources encourages agricultural productivity. This can be realized only if educational resources are accurately targeted at different groups active in the poultry value chain. Training should be practically oriented and tailormade as different actors have different levels and intensities of poultry farming. Currently, knowledge and training institutes in Bangladesh inadequately respond to the growing industry and the situation smallholder poultry farmers are in.
Academic curricula on agriculture exist in Bangladesh, but particularly practical education targeted at farmers is lacking. To bridge knowledge gaps of farmers, more resources should be allocated for improving and expanding practical oriented education. Extension agents in Bangladesh play decisive roles herein. They are ought to possess essential know-how and should offer direction in prioritizing knowledge gaps. Extension agencies among others include intermediate private training institutes, but also public institutes, such as the Department of Livestock (DLS) and the Bangladesh Livestock Research Institute (BLRI), can conduct training programs and raise awareness. Larive-LightCastle identified two possible ways through which practical training programs can be improved.

First, for Dutch knowledge on poultry farming to better reach local farmers, Larive-LightCastle sees opportunities to establish a more closely-knit network between Dutch knowledge institutes and local extension agencies. To enable the formation of cross-country collaborations, local extension agencies should connect directly with Dutch education and training institutes. After establishing a cooperation, through these extension agencies, teaching practices and curricula can be shared to eventually better educate (smallholder) poultry farmers. Larive-LightCastle deems this to offer significant opportunities provided the currently modest role of Dutch education on poultry in Bangladesh.

Second, local education institutes may employ more appropriate extension agents that link Dutch knowledge with local players. Knowledge conveyers ideally are graduates from agricultural schools with deep sector knowledge of the Bangladesh poultry sector. In Bangladesh, only 250 people graduate on Animal Husbandry and 500-600 people on Veterinary Science annually. Besides, a common finding is that agricultural students after graduation do not utilize their knowledge to forward local farmers as they frequently end up in governmental organizations. Larive-LightCastle argues that a large unexploited opportunity might be to engage more agricultural graduates in training Bangladeshi farmers.

Organizing exchange programs, allowing students enrolled in poultry education in Bangladesh to visit Dutch universities can have the desired effect. Exchange programs can expand their horizon in terms of realizing the possible ways through which the remaining potential of the domestic poultry sector can be bridged. These programs may increase awareness among students for them to fulfil a more active role in the development of the domestic poultry sector. Conversely, through organizing student exchange programs, accompanied with the right incentives, Dutch students enrolled in agricultural programs may fulfil the role of a local extension agent in Bangladesh with the aim to improve and expand training. Support from (local) government bodies in both countries is required to launch these exchange programs.

Development of selective training programs

This subsection describes a possible recommendation for Dutch stakeholders to improve poultry practices of farmers through local extension agencies. It addresses the question of how to realize a greater share of successful (independent) farmers in poultry rearing.

Dutch stakeholders, preferably a combination of education institutes, possessing didactic skills, and poultry farmers, possessing practical knowledge, can fulfil an active role in forwarding existing and developing new cooperative programs if matched with local extension agencies. To benefit from the cooperative, from farmers it is demanded that they measure their farm performance and actively participate in the cooperative's curriculum. Based on performance, the cooperation suggests alternative measures if needed. Joining forces as independent farmers facilitates knowledge transfer among farmers similarly.

When locally active, Dutch stakeholders themselves gain from the development of cooperative programs as it facilitates the formation of more secure sales and procurement channels, including shipment of birds to slaughterhouses, and sales of feed to cooperatives, rather than sales to farmers individually. Therefore, Larive-LightCastle recognizes that a possible way for Dutch stakeholders to transfer knowledge is to play a more prominent role in developing these programs.

7.5 Private sector development instruments to utilize opportunities

Multiple PSD instruments can be utilized to exploit the identified sector opportunities.

- The DHI subsidy scheme can be utilized to increase the chance to successfully enter the sector as a Dutch stakeholder or to increase the chance of a local poultry player to invest in Dutch equipment.[43]

43Source : https://english.rvo.nl/subsidies-programmes/dhi

- In the former case, a feasibility study can be conducted to assess the attractiveness of investing in the sector from a Dutch point of view.
- In the latter case, an investment feasibility study can be conducted from the perspective of a poultry actor in Bangladesh. The study is to provide insight into the attractiveness of the investment and to increase awareness of the benefits of using improved equipment involved. Local players in Bangladesh can be reluctant to invest due to information asymmetry. A DHI study can resolve this issue. Investments that would forward the sector include investments in data management systems, disease control systems, feed mill solutions, feed storage solutions, mid/high-tech hatching machinery and equipment, mid/high-tech egg handling machinery and equipment, storage and transport solutions, wastewater treatment solutions, ventilation and heating systems, climate control solutions, cold storage & transport and slaughtering equipment, among others. These investments offer significant potential to forward the sector, making a DHI subsidy program appropriate, both from the perspective of the investor and manufacturer.
- The DHI subsidy scheme can furthermore be used to demonstrate Dutch technology in Bangladesh for potential clients to witness the benefits of state-of-the-art machinery and equipment themselves.

➢ The Impact Cluster program offers the possibility to utilize opportunities in a consortium, including public and private sector stakeholders. Impact Clusters have a three-year project period in which training, capacity building and demonstration activities need to be executed by Dutch and Bangladeshi companies. A consortium could for example aim to establish a local demonstration farm, showcasing (semi)closed farming systems and applying international biosecurity and food safety standards. Such demonstration activities can be used to proof the business case for investments in Dutch equipment by Bangladeshi actors.

➢ The SDG Partnership facility (SDGP) aims to help achieve the following sustainable development goals (SDG) in developing countries:[44]
- SDG 2 (ending hunger).
- SDG 8 (decent jobs and economic growth).
- SDG 17 (partnerships for the goals).

Consortia could apply for SDGP funding if the project focus is on improving (one of) the above-mentioned SDGs while developing the poultry sector.

➢ Partners for international business (PIB) is a programme that allows Dutch businesses to enter into a public-private partnership to realise their international ambitions.[45] Merging forces allows for establishing a stronger foothold in Bangladesh. Combining technological expertise in various steps of the poultry value chain strengthens the position of Dutch poultry stakeholders in Bangladesh, but also offers integrated poultry actors in Bangladesh the opportunity to improve different parts of their production chain simultaneously.

44 Source : https://english.rvo.nl/subsidies-programmes/sdgp

45 Source : https://english.rvo.nl/subsidies-programmes/partners-international-business-pib

8. Annexes

Annex 1 - List of interviewed stakeholders

Name	Type of business	Contact person	Designation	Contact details
ACI Godrej	Integrator	Mohi Uddin	Finance Director	01713082750
Axon	Equipment supplier	Zahidul Islam	Managing Director	01711546840
Chicks & Feeds	Equipment supplier	Ekhlasul Haque	Managing Director	01713006084
FIAB	Association	Md. Sazzad Hossain	Advisor	01911316978
BPICC	Association	Debasish Nag	Secretary	01711371588
Kazi Farms	Integrator	Ishtiaq Ahmed	CEO	01713000950
New Hope	Integrator			
Nourish	Integrator	Shamsul Arefin Khaled	Director	01713335999
Provita	Integrator			
Quality	Integrator			
Bangladesh Agricultural Institute	Knowledge Institute	Professor Showket Ali	Poultry Teacher	01717838105
Bangladesh Agricultural Institute	Knowledge Institute	Professor Mahbub	Disease Management	01733792435
Renata	Pharmaceuticals	Md. Sirajul Islam	Director, Animal Health Division	01817143171
Spectra Hexa Feeds (Mega Feeds)	Feed manufacturing			

Annex 2 - Contact details of GP farm operators in Bangladesh

	Name of operator	Contact person	Designation	Contact details	Address
1	Aftab G.P. Farms Ltd.	Abu Luthfe Fazle Rahim Khan	Managing Director	Phone: +88 02 9568903, 9569092 E-mail: md @abflbd.com	Islam Chamber, 125/A, Motijheel C/A (8th Floor), Dhaka-1000
2	C.P. Bangladesh Co. Ltd.	Mr. Suchat Suntipada	President	Phone: +88 02 8919479, 8919103, Cell: 017133 70801, 01711-566481 (President)	House-28, Alaol Avenue, Sector-6, Uttara, Dhaka-1230
3	Kasila (Bangladesh) Limited	Iqbal Dada	Managing Director	Phone: +88 031 682930-1 Cell: 01711-339348 Email: mmagha@dominox.com	177, Khatungonj, Chittagong-4000
4	Kazi Grand Parents Limited.	Mr. Kazi Zeeshan Hasan	Managing Director	Phone: +880 2 9123432, 9134276, 9128062 Cell: 01711-530282	House: 84B, Road: 7A, Saat Mosjid Road (3rd, 4th, 5th Floor), Dhanmondi R/A, Dhaka-1209
5	M. M. Agha G.P. Farms Limited	Mr. Iqbal Dada	Managing Director	Phone: +88 031-682930-31, 681275 Cell: 01711-721234 Email: mmagha@dominox.com	177, Khatungonj, Chittagong-4000
6	Nourish Grand Parents Ltd.	Mr. Shamsul Arefin Khaled.	Director	Phone: 7913023-27, Cell: 01713-336001 E-mail: nourish@gmail.com, anjon@nourish-poultry	Takia Center, H #39, R # Sonargaon Jonopath, House Building, Uttara, Dhaka
7	Paragon G.P. Ltd.	Mr. Moshiur Rahman	Managing Director	Phone: +88 02 9882107-8, 9898960, E-mail: info@paragongroup-bd.com	Paragon House, 5, Mohakhali, C/A (10th Floor) Dhaka-1212
8	Rashik GP & Hatchery Ltd.	Mr. Syed Asaduzzaman	Managing Director	Phone: +88 02 9582319-21, E-mail: afidpoultry@zamangroup.com.bd, nadimnt@yahoo	City Center, Level-11, Block-D, 90/1 Motijheel C/A, Dhaka-1000

Annex 3 - Contact details of the main PS farms breeders and hatcheries in Bangladesh

	Name of farm	Focal point	Designation	Contacts	Address
1	Advance Animal Science Co. Ltd.	Dr. M.M. Khan	Managing Director	Phone: 88-02-8158965, 8158967-8, E- Mail: munzur.khaan@yahoo.com	2/10, Block # B, Lalmatia, Dhaka-1207
2	Advance Bio-Products Limited	Dr. M. Nazrul Islam	Managing Director	Mobile: 01713-033847 E-Mail: nazruladcance@yahoo.com	AL Haj Shamsuddin Mansion (5th Floor) 17, Monghbazar, New Eskaton Road, Dhaka-1000
3	Ample Animal Care	S.M. Jasim Uddin	Managing Director	Phone: 02-89310795 Mobile: +8801711- 420800,+8801919-420800 E-Mail: ampleanimalcare@hotmail.com	House # 11 (3rd Floor), Road # 35, Sector # 7, Uttara, Dhaka-1230
4	Bengal Overseas Limited	Mr. A. K. M. Alamgir	Managing Director	Phone: 9894355, 9894366, 9894377 Mobile: 01713-019024 E-Mail: bol@bangla.net, rob.bol@bangla.net	Paragon House (6th floor), 5, Mohakhali C/A, Dhaka-1212
5	Chicks & Feeds Ltd.	Ekhlasul Haque	Managing Director	Phone:88-02-8142532-33, Mobile: 01711262394 E-Mail: info@cknfeeds.com Web: www.cknfeeds.com	84, Sheikh Rassel Square 56/4, (3rd Floor), West Panthapath, Dhaka-1205
6	Paragon Group	Mr. Moshiur Rahman	Managing Director	Phone: 8821393, 9882107-8, 9898960 Mobile: 01711-630520 E-Mail: Paragon@neksus.com	Paragon House (10th Floor), 5 Mohakhali C/A, Dhaka-1212
7	Poultry Consultant & Dev. Services	Md. Rafiqul Haque	Poultry Consultant	Phone: 880-2-9665646, 9670633 E-Mail: Poultconbd@gmail.com	Kashba Centre (4th Floor) House # 5/2, Road # 4, Dhanmondi R/A, Dhaka-1205.
8	Protimax Internatioal	Md. Golam Masud	Chief Executive Officer	Phone: +88-02-8961065, 8916192 Mobile: +88-01711-720955, +88-01711-898167 E-Mail: cndhaka@gmail.com, mileagebd@gmail.com Web: www.mileagebd.com	House # 11 (3rd Floor), Road # 35, Sector # 07, Uttara, Dhaka- 1230, Bangladesh.
9	Zaman Group	Syed Asaduzzaman	Managing Director	Phone: 9554170, 9551570 Mobile: 01711-387886, 01817-149007 E-Mail: rafidpoultry@zamangroup.com.bd zaman@butterfly-lg.com Web: www.zamangroup.com.bd	71, Motijheel C/A, Mahbuh Mansion (Ground FL), Dhaka-1000

Annex 4 – Contact details poultry equipment vendors

	Name of Farm	Focal Point	Designation	Contacts	Address	Products
1	Advance Animal Science Co. Ltd.	Dr. M. M. Khan	Managing Director	Phone: 88-02-8158965, 8158967-8 E-mail: munzur.khan@yahoo.com	2/10, Block-B, Lalmatia, Dhaka-1207	Veterinary pharmaceuticals, veterinary vaccines, animal nutrition products, disinfectants, and veterinary equipment
2	Advance Bio-Products Limited	Dr. M. Nazrul Islam	Managing Director	Cell: 01713 033847 E-mail: nazruladvance@yahoo.com	Al haj Shamsuddin Mansion (5th Floor) 17, Moghbazar, New Eskaton Road, Dhaka-1000	Import, marketing and distribution of veterinary pharmaceuticals, animal nutrition products, feed additives, poultry genetics, equipment & day-old chicks.
3	The Sudden Link Incubator Company	Md. Shohedul Haque (Bappy Hazary)	Proprietor	Cell: +88 01712 263573, 01190 992426 E-mail: www.slincubator.com Web: bappyhazary@yahoo.com	Bosumoty road, Bushundhara, Near of Baridhara Apolloo Hospital, Gulshan- 2, Dhaka- 1212	Large egg capacity incubator automatic 10 mood dampening, air dehumidifier regulation, water sprayer systems
4	Protimax International	MD. Golam Masud	Chief Executive Officer	Phone: +88 02 8961065, 8916192 Cell: +88 01711 720955, 01711 898167 E-mail: cndhaka@gmail.com, mileagebd@gmail.com Web: www.mileagebd.com	House: 11 (3rd Floor), Road: 35, Sector: 7 Uttara, Dhaka-1230, Bangladesh	Supplying industrial & agro machinery, equipment, poultry breeders, chemicals, feed additives, feed ingredients, food, commodities etc.
5	Birds Bangladesh	Md. Anis Ahmed	Managing Director	Phone: +88 02 9664719, +88 02 9667849 Cell: 01711 565864, 01929 996152 E-mail: birds06@gmail.com, Web: www.birdsbangladesh.com	House No: 3/1 (3rd Floor), Road No: 8, Dhanmondi, Dhaka-1207, Bangladesh.	Arrange importing & supplying the different poultry equipment such as Manual Nest Box, Flat Based Silos, Box Incubator, Indirect heat diesel brooder for Poultry, etc.
6	Brothers International	Md. Rezaur Rahman	Managing Director	Phone: 88 02 717060, 7174500 E-mail: brothersgroupagro@gmail.com; brothersgroupbd@gmail.com	Shadharan Bima Bhaban-2 (8th Floor) 139, Motijieel C/A, Dhaka.	
7	Brothers Poultry International	Md Serajul Islam	Managing Director	Cell: 01733 046474-84, 01711 684776	9/2, GHA (1st floor) New Secretariat Road, Fulbariya Dhaka-1000, Phone & fax: 88 02 9560220	

8	Changzhou Fengyu Silo Engineering Co. Ltd.	-	-	Phone: 880 4478012773-3, Cell: 01718 233286 E-mail: machinecom@live.com, mktg@machinedb.com Web: www.machiebdd	Road: 19, House: 04(3rd floor), Sector: 11 Uttara, Dhaka-123	Specializes in research, development design, sales and service of material storage and drying technology
9	Chia Tung Development (BD) Ltd.	Md. Rafiqul Haque	Managing Director	Phone: 88 02 9665646, 9670633 E-mail: poultconbd@gmail.com; chiatung1@gmail.com	Kashba Centre (4th Floor) House: 5/2, Road: 4, Dhanmondi R/A Dhaka-1205, Bangladesh	
10	Prestige Feed & Ingredient	Kazi Aziz Sobhan	Chief Executive	Cell: +88 01711 616282 E-mail: kazi.azizsobhan@gmail.com	House: 159 (2nd Floor), Road: 06, Block-Ka PC Culture Housing Soceity, Shamoly, Dhak-1207	Importer of animal nutrition & other feed supplements
11	Chicks & Feeds Ltd.	Ekhlasul Haque	Managing Director	Phone: 88 02 8142532-33, Cell: 01711 262394 E-mail: info@cknfeeds.com; Web: www.cknfeeds.com	Salvista Hub House: 8, (1st Floor), Road: 14, Dhanmondi	Supply machinery and plants and provide lifelong technical assistance, training & capacity building services to their client's engineers and technicians from the beginning of installation to commissioning of the plant
12	Jims Tech International	Dr. M. Ali Imam	Chairman	Phone: 88 02 8819573; E-mail: info@jimsbd.com, murshid.jahan@jimsbd.com Web: www.jimsbd.com	House: 43, (1st Floor) Flat: B; Road: 30, Mohakhali DOHS Dhaka-1206	Veterinary Pharmaceutical, Biological, Nutritional Products and Engineering Products
13	Eurinco Bangladesh	Engr. Nobab Ali	Managing Director	Phone: 88 02 8414388 Cell: 01920 791285, 01914 257932, 01914 162579 E-mail: eurinco@dhaka.net; Web: www.eurogroupbd.com	House: 542, (2nd Floor) Road: 12 D O H S, Baridhara, Dhaka	Manufacturing grain storage systems and steel framing products

Annex 5 - Contact details poultry medicine vendors in Bangladesh

	Name of Farm	Focal Point	Designation	Contacts	Address
1	Absolute Agrovet Ltd.	Dr. Md. Biplob Hasan Faruq	Managing Director	Mob:01711-482173, 01712-665600 E-Mail: absoluteagrovet@yahoo.com	Head Office: House No: 33, Road No: 4/A Banasree Project, Rampura, Dhaka-1219
2	ACI Limited	Dr. Arif Dowla	Managing Director	Pho.: 9885694 Ext: 512 E-Mail: edab@aci-bd.com helal@aci-bd.com	ACI Center 245, Tejgaon Industrial Area Dhaka-1208
3	Advance Animal Science Co. Ltd.	Dr. M. M. Khan	Managing Director	Mob-01711-548070 Pho.: 8158965, 8158967-8 E- Mail: munzur.khaan@yahoo.com	Khaja Manjil, 2/10 (1st floor) Block # B, Lalmatia, Mohammadpur, Dhaka-1207.
4	Advance Bio-Products Ltd.	Dr. M. Nazrul Islam	Managing Director	Mob- 01713033847 E-Mail: nazruladcance@yahoo.com	Al-Haj Shamsuddin Mansion (5th floor) 17, Bara Moghbazar, New Eskaton Road., Dhaka -1000
5	Advent Pharma Ltd.	Mohammad Jawaid Yahya	Managing Director	Pho: 02-9138109 Mob: 01911-359801, 01755-557569 E-Mail: adventpharma@gmail.com	1/10 (1st FL), Block-A, Lalmatia, Dhaka-1207
6	Agri Health Ltd.	Md. Asaduzzaman Biswas	Managing Director	Pho: 9130886 Mob: 01819-222590 E-Mail: agrihealth@dhaka.net	57/E, Kazi Nazriul Islam Avenue (3rd Floor) Kawran Bazar Dhaka-1215
7	Agronomy Animal Health Ltd.	Md. Jashim Uddin	Managing Director	Pho: 8831627 E-Mail: agronomybd@yahoo.com Web: www. Agronomyah.com	191/2 Malibagh Bazar Road Malibagh, Dhaka-1217
8	Agrovet Pharma	Md. Aminur Rahman	Managing Director	Pon: 02-9552598 Mob: 01914-242801, 01733-990136 E-mail: agrovetpharma.bd@gmail.com	51, 51/A, Purana Paltan, Level # 6
9	Alltech Biotechnology Pvt. Ltd.	Alltech Biotechnology Pvt. Ltd.	General Manager	Pho: +88029898057, +88029898012 Email: AlltechBangladesh@Alltech.com Web: www. alltech.com	N.R. Tower (4th Follr), 72 Pragoti Sarani Block- J, Baridhara, Dhaka-1212, Bangladesh
10	Al-Madina Pharmaceuticals Ltd.	Md. Zakir Hossain Patowary	Managing Director	Pho: 88-02-8712019, 88-02-8834052 Email: madina@eplanet.net Web: www.almadinapharma.com	House- 407, Road- 29, New DOHS, Mohakhali, Dhaka-1206
11	Ample Animal Care	S.M. Jasim Uddin	Managing Director	Mob: 01919-420800, 01711-420800, 01611-420800 Email: ampleanimalcare@hotmail.com	House-11 (3rd Floor), Road-35 Sector-7, Uttara Dhaka-1230
12	Anivet Agro Products Ltd.	Md. Rasel Meah	Managing Director	Pho: +88028919277 Mob: +8801811408360, +8801811408362	House # 5 (1st Floor), Road # 10 Sector # 4, Uttara Dhaka-1230
13	AR Animal Health Limited	Mr Mohd Atiar Rahman	Managing Director	Mob: 01713011040, 01970-029103 Pho: +880-2-8911859, 8917504 Email: aranimalhealth@gmail.com, Atiarr87@gmail.com	Torpical Alauddin Tower, House-32/C, Flat: 10-C (10th Floor), Road-02, Sector-03, Uttara, Dhaka-1230
14	Arafat Enterprise	Mr Md Sarwar Alam	Managing Director	Pho: +88028821544 Email: Dhaka-bd2007@yahoo.com	House# 16 (5th Floor), S. W-5 Road #10, Gulshan-1, Dhaka-1212
15	Arifs (Bangladesh) Ltd.	Mr. Khairul Kabir Arif	Managing Director	Pho: 9550544, 9553061 Email: arifs@dhaka.net Web: www.arifsbd.com	18 Rajuk Avenue, Lal Bhaban (7th Floor) Motijheel C/A, Dhaka-1000

Annex 6 - Export and import duties of poultry (production) related products in percentages

HS Code	Description	CD	SD	VAT	AIT	RD	ATV	Total tax incidence	Statistical unit	Statutory rate of import duty statutory	Rate of export duty from BD[46]	Rate of export duty from NL
0105.11.90	Live Fowls Gallus, Domesticus<=185g, Excl. Parent Stock Of One Day Chick	25	0	0	5	3	5	41.11	u	25	Free	25
0105.11.10	Fowls Of The Species Gallus Domestic(Parent Stock One Day Chick)	0	0	0	0	0	5	6.33	u	0	Free	0
1602.39.00	Preparations Of Poultry (Excl. turkey/fowls Of Species Gallus Domesticus)	25	0	15	5	3	5	60.31	u	25	Free	25
0105.94.00	Fowls of the species Gallus domesticus	25	0	0	5	3	5	41.11	u	25	Free	25
8436.21.00	Poultry Incubators And Brooders	1	0	0	5	0	5	12.4	u	1	Free	1
8438.50.00	Machinery For The Preparation Of Meat Or Poultry	1	0	15	5	0	5	27.6	u	1	Free	1
8436.10.00	Machinery For Preparing Animal Feeding Stuffs	1	0	0	5	0	5	12.4	u	1	Free	1
8436.29.00	Other Poultry-Keeping Machinery, Nes	1	0	0	5	0	5	12.4	u	1	Free	1
2304.00.00	Oil-cake and other solid residues whether or not ground or in the form of pellets, resulting from the extraction of soya-bean oil	0	0	0	0	5	5	11.65	kg	0	Free	0
2303.30.00	Brewing or distilling dregs and waste	0	0	15	0	0	5	21.33	kg	0	Free	0
2303.10.00	Residues of starch manufacture and similar residues	0	0	0	0	0	5	6.33	kg	0	Free	0
2306.90.00	Oil-Cake And Other Solid Residues, Of Other Vegetable Fats And Oils (Fishmeal)	5	0	0	0	0	5	11.65	kg	5	Free	5
2308.00.00	Vegetable materials and vegetable waste, vegetable residues and byproducts, whether or not in the form of pellets, of a kind used in animal feeding, not elsewhere specified or included.	0	0	0	0	0	5	6.33	kg	0	Free	0

CD – Custom duty
SD – Supplementary duty
VAT – Value added tax
AIT – Advance income tax
RD – Regulatory duty
ATV – Advanced trade VAT

[46] Although export tariffs are officially absent, Bangladesh is prohibited to export poultry products that originate from regions affected by recent disease outbreaks (< 3 years).

Annex 7 – Breeders Association Bangladesh: Members information

SL.	Name	Position in Executive Committee	Designation & Company Name
1	Md. Rakibur Rahman (Tutul)	President	Managing Director **Nahar Agro Complex Ltd.** Plot-02, Road-01, Paharika R/A, South Khulshi, Chittagong. Phone: 031-623727 Mob: +88 01819-37 38 37 E-mail: naharpoultry@yahoo.com, E-mail: naharagro@yahoo.com rrtutul@yahoo.com
2	Syed Asaduzzaman	Senior Vice-President	Managing Director **Rafid Poultry & Hatchery Ltd.** City Center, Level-11, Block-D 90/1 Motijheel C/A, Dhaka Phone: 02-9551570 Mob- 01711-561251 E-mail: zaman@zamangroup.com.bd
3	Md. Safiqul Islam	Vice- President	Managing Director **Aman Breeders Ltd** 2 Ishakha Avenue, Sector-6 Uttara, Dhaka-1230 Mob- 01755-675000, 02-7911691-3 E-mail: shofiqul@amangroupbd.com
4	Mr. Asifur Rahman	General Secretary	Director **Bay Agro Industries Ltd.** TCB Bhaban, 1, Kawran Bazar (9^{th} Floor), Dhaka-1215 Phone: 02-8111445, 8124147, Mob: +88 01711-594723 Email: arahman@baygroupco.com
5	Quazi Gaffar Ahmed	Joint Secretary	Director **The Bangladesh Hatcheries Ltd.** 237, Outer Circular Road Bara maghbazar, Dhaka-1217 P: 8322720, Mob:01711-842842 E-mail: qg.ahmed@yahoo.com
6	Mr. Shamsul Arefin Khaled	Treasurer	Director **Nourish Poultry & Hatchery Ltd.** Takia Center, House #39, Road # Sonargaon Janapath, House Building, Uttara, Dhaka Phone: 7913023-27 Mob: +88 01713335999,01730050008 E: anjon@nourish-poultry.com

7	**Mohammed Nurunnabi Bhuiyan**	**Organizational Secretary**	**Chairman** **Provita Hatchery Ltd.** House # 270, Road #03, DOHS, Baridhara Dhaka. Phone: 031-815465, Mob-01819-311608 E-mail: nurunnabi.provita@yahoo.com
8	Saheda Pervin Trisha	Cultural Secretary	Director **V.I.P. Shahadat Poultry & Hatchery Ltd.** House # 4, Flat # B-5, Road # 23/A Block # B, Banani, Dhaka-1212 Mob: +88 01715-42 85 87 E-mail: sptrisha007@gmail.com
9	Md. Mahabubur Rahman	Public Relation & Media Secretary	Managing Director **Peoples Poultry & Hatchery Ltd.** 382, Tongi Divertion Road (4th Floor) Moghbazar, Dhaka Mob: +88 01711-52 09 29 E-mail: md@peopleshatchery.com
10	Md. Mosleh Uddin	Office Secretary	Director **Planet Agro Ltd.** 7-B Delta Dahlia, 36 Kamal Ataturk Avenue, Banani C/A, Dhaka-1213 Mob: +88 01713-064992 E-mail: muddin101@gmail.com
11	Mr. Moshiur Rahman	Executive Member	Managing Director **Paragon Poultry Ltd.** Pragon House (10th Floor) 5, Mohakhali C/A, Dhaka-1212 Mob: +88 01711-52 69 02 Phone: 9882107-8 E-mail: mrahman@paragongroup-bd.com
12	Mr. Abu Luthfe Fazle Rahim Khan	Executive Member	Managing Director **Aftab Bahumukhi Farms Ltd.** **Jahurul Islam Company** 59/B (2nd Floor), Kamal Ataturk Avenue, Banani, Dhaka-1213 Mob: +88 01713-00 02 89 Phone: 55033668, 55035364 E-mail: md @abflbd.com
13	Lt Gen. M. Harun-Ar-Rashid, BP (Retd.)	Executive Member	Managing Director **Rashid Krishi Khamar Limited** House # 415, Road # 30, DOHS, Mohakhali, Dhaka-1206. Phone: 8714383, Mob: +88 01711-56 00 78 E-mail: krishikhamar_rashid@yahoo.com

14	**Mr.Saidur Rahman Babu**	**Executive Member**	**S.B. Hatcheries Ltd.**
			126-131, Monipuripara Tejgaon, Dhaka
			P-9114747, 9124729
			Mob:01713-042080, 01919042080
			E-mail: srbabu7@yahoo.com
			E-sbhatcheriesltd@gmail.com
15	Mr. M. Asghar Dada	Executive Member	Director
			M. M. Agha Limited
			177, Khatungonj, Chittagong-4000
			Phone :031-692930, Mob: +88 01713-102011
			E-mail: mmagha@dominox.com

Annex 8 – World's Poultry Science Members: Members information

SL	Name position and Int'l ID	Contact details
1	**Shamsul Arefin Khaled**	Director, Nourish Poultry & Hatchery Ltd.
	President	House # 39, Takia Center, Sonargaon Janapath, Sector # 7, House Building, Uttara, Dhaka-1230, Ph: 8115033,
	Int'l ID: I-19635	Email : anjon@nourish-poultry.com, anjon@khaled-group.com
2	**Abu Luthfe Fazle Rahim Khan**	Managing Director, Aftab Bahumukhi Farms Ltd.
	Sr. Vice President	Jahurul Islam Company
	Int'l ID: I-19636	59/B (2nd Floor), Kamal Ataturk Avenue,
		Banani, Dhaka-1213, Mob: 01713000289
		Email: md@abflbd.com
3	**Yasmin Rahman**	Director, Paragon Group
	Vice President	5, Mohakhali C/A (10th Floor), Dhaka-1212
	Int'l ID: I-10289	Tel: 9882107, 9882108, Mob: 01711-535642, Email: yrahman@paragongroup-bd.com
4	**Mr. Zahidul Islam**	Managing Director, Axon Ltd.
	Vice President	Russel Park (5th Floor)
	Int'l ID: A-19612	House # 101, Road # 13/A, Block # C, Banani, Dhaka-1213,
		Mob: 01711546840, Email: info@axon-group.net
5	**Dr. Md. Shawkat Ali**	Professor, Department of Poultry Science, BAU, Mymensingh-2202, Mob: 01717838105
	Vice President	Email: mdshawkatali@hotmail.com
	Int'l ID: I-21435	
6	**Dr. Md. Ershaduzzaman**	Principal Scientific Officer, BLRI, Savar, Dhaka-1341, Tel: 027792206,Mob: 01716484238
	Vice President	Email: ershad1988@hotmail.com
	Int'l ID: I-19564	
7	**Md. Mahabub Hassan**	Executive Vice President, Avon Poultry
	General Secretary	House # 04 (3rd Floor), Road # 04, Sector # 05, Uttara, Dhaka-1230, Ph: 8615302-8, Mob: 01727061069
	Int'l ID: I-6925	E-mail: md.mhassan@gmail.com
8	**Dr. A.B.M Khaleduzzaman**	ULO, DLS
	Joint Secretary	Krishi Khamar Sarak, Farmgate, Tejgaon,
	Int'l ID: I-22017	Dhaka-1215, Mob: 01716001137
		E-mail: abmk5566@gmail.com
9	**Dr. M. Ali Imam**	Managing Partner, Jims Tech International
	Treasurer	House # 469 (2nd Floor), Road # 31
	Int'l ID: I-9170	Mohakhali New DOHS, Dhaka-1206
		Tel: 9883076, Mob: 01714039024
		Email : murshid.jahan@jimsbd.com, ali.imam@jimsbd.com

Annex 9 – Instruments for export financing from the Netherlands to Bangladesh

Atradius:	Atradius provides a number of insurances and guarantee products that stimulate trade and minimize risks faced by Dutch companies when they do business abroad. Via combining some of their services offered, Atradius offers Dutch companies the unique opportunity to insure their export against non-payment, while granting credit to their Bangladeshi off-taker, simultaneously ensuring full payment to the Dutch exporting company upon the moment of receipt of goods by the Bangladeshi client. In order to be able to apply for either Supplier Credit or Buyer Credit, the following requirements have to be met: ➢ Applicant (either main-contractor or sub-contractor) must be a Dutch legal entity; ➢ Dutch content of export contract is at least 20%; ➢ Content consists of capital goods and/or construction works; ➢ Client has to be established in a country that meets Atradius' country classification (including Bangladesh); ➢ Atradius' country portfolio must have funds available; ➢ Export contract value is minimum EUR 5 MN – maximum EUR 100 MN; ➢ (Under DGGF/DTIF program Atradius could finance contracts with a value of EUR 0 - 15 MN without intervention of a bank); ➢ Credit periods off-taker will be minimum 12 months, but maximum 5 years; ➢ All transactions must comply with OECD standards; ➢ Export contracts above EUR 10 MN must comply with CSR standards; ➢ Risk period to be insured >12 months <5 years; ➢ Down payment of minimum 15% of export contract is required; ➢ At most 85% of the export contract value may be financed; ➢ Indemnification is covered to 90% (private off taker) – 98% (public off taker).
DGGF:	Under the DGGF program, Atradius could co-finance export transactions without intervention of a bank, that are currently not supported by the market or regular governmental ECI facilities due to the geographical position, term, or nature or scope of the transaction. Apart from the requirements set, Atradius could finance export credit, if: ➢ Export contract value is < EUR 15 MN; ➢ Direct financing is < EUR 5 MN; ➢ A project has Development Impact.
FMO:	FMO is required to test all of its investments against the following dimensions of development impact: ➢ Financial additionality: providing financial services only where the market can or does not do the same, or otherwise does not provide on an adequate scale or on reasonable terms; ➢ ESG additionality: providing additional, non-financial value (such as green and inclusive development impact, environmental and social risk management and governance improvements); ➢ Catalytic role: maximizing the flow of finance to FMO's client(s) by mobilizing third-party funds. FMO further applies the following principles: ➢ FMO's finance activities are limited to developing countries (Bangladesh among); ➢ No finance is to be provided to a country which is in a state of war or armed conflict with another country; ➢ No finance is to be provided to a country which is engaged in serious internal conflict or civil war, unless the country in question has been approved by FMO's Asset Liability Committee;

	➢ FMO will attempt to ensure that low-income and lower middle-income economies account for approximately 70% of investments, approximately half (35%) of which being accounted for by low income economies.

Annex 10 – Potential field of improvement a Dutch PPP could address

1. Improving poultry health & disease control.

Purpose:	The purpose of this intervention is to improve poultry health and disease control in Bangladesh, to enable sustainable development of the domestic poultry sector.
Situation:	In order to enable a more efficient poultry production system in Bangladesh and to fulfil the international rules and regulations on food safety and export requirements of poultry products, further strengthening of the poultry health management system (notably improving cooperation between actors), improving surveillance, prevention and control of poultry diseases/epidemics and the veterinary diagnostic system is needed.
Focus:	Envisioned intervention focus: ➢ Antibiotic reduction & alternatives ➢ Increasing use of correct vaccines ➢ Data management systems and disease control systems
Activities:	Envisioned activities: ➢ Demonstration of antibiotic reduction practices and alternatives. ➢ Promotion of finisher feed. ➢ Develop and institutionalize a platform of Bangladeshi poultry sector stakeholders in order to increase awareness, improve knowledge transfer and capabilities about poultry health and disease control. ➢ Advise on setting up an 'independent' data collection system of poultry diseases to improve animal disease control and epidemiological capabilities. ➢ Support Livestock Research Institute with vaccine production. ➢ Identify poultry vaccines available in Bangladesh and draft vaccination schemes and strategies for poultry farmers and veterinarians. ➢ Draft protocols for disease surveillance, monitoring and control programs for the 3 most important poultry diseases. ➢ Implement a nationwide diagnostic veterinary system. ➢ Develop a training program on animal health and disease control. ➢ Train government employees, (field) veterinarians, epidemiologists, lab staff and lab technicians) on poultry disease surveillance, monitoring and control programs.
Results:	Envisioned results: ➢ Increased awareness, knowledge and capabilities among government employees, (field) veterinarians, epidemiologists, lab staff and lab technicians. ➢ Improved laboratory network and nationwide diagnostic veterinary system. ➢ Reduction of antibiotic usage. ➢ Increase in use of antibiotic alternatives. ➢ Increased vaccine availability.
Project parties:	Dutch parties that could support in the implementation of the intervention could include DSM, Kepro, Trouw Nutrition, Kanters Specialty products, Wageningen UR, AviVet, GD Animal Health, Aeres, MSD Animal Health, IntraCare, FarmResult, BioChek, and Palital Feed Additives.

2. Improving feed formulation and increase feed mill efficiency

Purpose:	The purpose of this intervention is to improve the knowledge levels of feed millers in Bangladesh and increase efficiency of feed mill operations. This will contribute to a more competitive and sustainable development of the domestic poultry sector. Improved knowledge and efficiency will also contribute to increased feed mill and on-farm performances.
Situation:	Feed milling is an essential step in the poultry value chain. Feed costs represent roughly 70% of the costs of final products. Efficient production and usage of feed therefore has an enormous impact on profitability of mills and farms. Poultry farmers in Bangladesh face high volatility in feed prices, heavily influencing their operational profitability.
Focus:	Envisioned focus: ➢ Mid/high-tech feed mill solutions ➢ Premixes, additives and enzymes ➢ Improved feed storage solutions
Activities:	Envisioned activities: ➢ Formulate scenario's to improve the operations of feed mills and provide insight in the potential relevant investments that could support realising these improvements. ➢ Demonstrate best practices, equipment and storage solutions at established demonstration feed mill. ➢ Develop a training program on feed formulation, equipment, storage and best practices. ➢ Establish feeding protocols for poultry farmers. ➢ Train feed mill managers on feed mill efficiency, production processes & sustainability, product safety and storage conditions (theoretical and practical training). ➢ Train poultry farmers on best feeding practices. ➢ Disseminate the results within the poultry sector stakeholders in Bangladesh.
Results:	Envisioned project results: ➢ Increased awareness, knowledge and capabilities among Bangladeshi feed manufacturing managers about feed production processes, nutritional knowledge & formulation, usage of premixes, additives and enzymes, reduction of antibiotics in feed, equipment and storage of final products. ➢ Fully operational demonstration feed mill. ➢ Shift from low-tech to mid/high tech feed mill equipment. ➢ Increased feed mill efficiency. ➢ Improved feed quality. ➢ Improved on-farm performances by using high quality feed. ➢ Reduction in moults and toxins in feed due to improved storage solutions.
Project parties:	Dutch parties that could support in the implementation of the intervention could include DSM, Agrifirm, ForFarmes, Trouw Nutrition, De Heus, Wageningen UR, Aeres, Van Aarsen, and Ottevanger.

3. Strengthening the capabilities of breeding farms and hatcheries

Purpose:	The purpose of this intervention is to improve the knowledge level of broiler and layer breeder and hatchery managers in Bangladesh.
Situation:	Breeders and hatchery operators face challenges in terms of: ➢ Hatching egg quality; ➢ Storage and incubation conditions; ➢ Data analysis; ➢ Hatching egg transport; ➢ Managing fertility and uniformity; ➢ Optimal usage of hatching machinery and equipment; ➢ Post-hatch performance.
Focus:	Envisioned project focus: ➢ Mid/high-tech hatching machinery and equipment ➢ Mid/high-tech egg handling and transport solutions ➢ Storage ➢ Data management systems
Activities:	Envisioned project activities: ➢ Formulate scenario's to improve the breeding farm and hatchery operations (in terms of equipment and procedures) and provide insight in the potential relevant investments that could support realising these improvements. ➢ Introduce mid/high-tech hatching machinery and equipment at demonstration location. ➢ Introduce mid/high-tech egg handling and transport solutions at demonstration location. ➢ Develop a training program on breeding and hatchery practices, machinery and equipment, storage and data management. ➢ Train breeder and hatchery management (theoretical and practical training). ➢ Disseminate the results within the poultry sector stakeholders in Bangladesh.
Results:	Envisioned project results: ➢ Increased awareness, knowledge and capabilities among Bangladeshi breeder and hatchery managers, university lecturers and students and other private sector representatives about breeder and hatchery management. ➢ Increased use of mid/high-tech breeding and hatchery solutions. ➢ Increased breeding and hatchery performances. ➢ Reduced DOC price volatility. ➢ Improved egg handling and transport practices. ➢ Increased fertility and uniformity rates.
Project parties	Dutch parties that could support in the implementation of the intervention could include Pas Reform, Moba, HatchTech, Viscon, Vostermans Ventilation VDL AgroTech, Vencomatic, Gasolec, Fancom, FarmResult, Hotraco, Stienen BE, Sanovo and Jansen Poultry Equipment.

4. Improving poultry farm management (focusing on biosecurity)

Purpose:	The purpose of this intervention is to improve the biosecurity levels at poultry farms in Bangladesh.
Situation:	Majority of the farms in Bangladesh have open-house systems and do not apply biosecurity standards and measures.
Focus:	Envisioned project focus: ➢ Wastewater treatment solutions ➢ Ventilation ➢ Heating ➢ Climate control solutions
Activities:	Envisioned project activities: ➢ Formulate scenario's to improve the operations of poultry farms in Bangladesh (in terms of farm management and biosecurity measures)and provide insight in the potential relevant investments that could support realising these improvements. ➢ Create a business case for farm upgrade: from open-housing with no biosecurity, to (semi-)closed housing with biosecurity. ➢ Introduce biosecurity measures and solutions at demonstration farm. ➢ Demonstrate best practices at demonstration farm. ➢ Develop a training program on biosecurity. ➢ Train farmers about the importance of biosecurity, measures, solutions and best practices. ➢ Disseminate the results within the poultry sector stakeholders in Bangladesh.
Results:	Envisioned project results: ➢ Increased awareness, knowledge and capabilities among Bangladeshi farmers, university lecturers, students, and private sector representatives about on-farm biosecurity. ➢ Improved farm performances and more efficient poultry production systems. ➢ Increased investments in wastewater treatment, ventilation, heating, climate control, and stall equipment. ➢ Less disease outbreaks and improved animal health. ➢ Fully operational (semi)-closed demonstration poultry farm.
Project parties:	Parties may include Kanters Specialty products, Hato, Vostermans Ventilation, VDL AgroTech, Vencomatic, Gasolec, Fancom, FarmResult, Hotraco, Stienen BE, Sanovo and Jansen Poultry Equipment Aeres, GD Animal Health.

5. Food safety

Purpose:	The purpose of this intervention is to improve food safety and product control in Bangladesh to enable sustainable and safe sector development.
Situation:	At the public level, there is insufficient awareness of the importance of food safety and proper slaughtering processes and there is no implemented structural surveillance, prevention and control on food safety and product quality. As a result, Bangladesh faces low levels of food safety (bacterial contaminations, zoonotic disease (salmonellosis), micro-organisms, high antibiotics residual exposure and reduced shelf lives).
Focus:	Envisioned project focus: ➢ Cold storage & transport; ➢ Slaughterhouses & further processing; ➢ Increasing awareness.
Activities:	Envisioned activities: ➢ Formulate scenarios to improve the food safety practices in Bangladesh (in terms of measures and solutions) and provide insights in the potential relevant investments that could support realising these improvements. ➢ Create a business case for cold storage and transport. ➢ Create a business case for slaughtering and further processing. ➢ Find a local partner to establish an independent slaughtering and processing demonstration facility. ➢ Introduce mid/high-tech and safe cold storage and transport solutions best practices ➢ Introduce mid/high-tech and safe slaughtering and processing equipment and best practices. ➢ Develop a training program about food safety for consumers. ➢ Train consumers on food safety to increase awareness. ➢ Create a food safety marketing campaign to advocate for slaughtered and processed meat instead of wet market sales. ➢ Develop a training program for poultry meat and egg salesman and retailers on the topic of cold storage and transport. ➢ Train retailers on the importance of cold storage and safe transport. ➢ Develop a training program for interested slaughtering and processing entrepreneurs. ➢ Train entrepreneurs on best slaughtering and processing practices. ➢ Disseminate the results within the poultry sector stakeholders in Bangladesh.
Results:	Envisioned project results: ➢ Increased awareness, knowledge and capabilities among Bangladeshi farmers, university lecturers, students, retailers, and private sector representatives about food safety. ➢ Improved food safety in the Bangladeshi poultry sector. ➢ The establishment of an independent slaughterhouse and further processing facility. ➢ Improved food safety standards applied by processor, salesman and retailers. ➢ Increase in sales of processed poultry meat. ➢ Reduction of sales at wet markets. ➢ Reduction of human health hazards and food poisoning. ➢ Increased acceptance among Bangladeshi consumers about the advantages (food safety, higher quality) of hygienically slaughtered, stored and transported poultry meat. ➢ Advice on which poultry meat product-market combinations would be commercially and technically feasible for Bangladeshi poultry meat processors/suppliers.
Project parties:	Parties may include Celtic Cooling, Coolfinity, Marel, Meyn, GEA Food Solutions, FoodMate, Nijhuis Industries, Mavitec, NEPLUVI, Aeres.

Annex 11 – Overview of international operating Dutch poultry sector companies and current activities in Bangladesh

Company	Info	Website	Active in Bangladesh
Aeres	Offers poultry sector trainings to farmers, government, veterinarians, feed millers, hatcheries, and other stakeholders.	www.aerestrainingcentre.com	Unknown
Agrifirm	Offers animal feeds, premixes, concentrates, mineral mixes, additives for the animal feed industry.	www.agrifirm.com	No
Agriterra	Provides expert advice and training to cooperatives and farmer organisations in emerging economies.	www.agriterra.org	Yes
Almex	Specialises in single screw extrusion equipment, from the extrusion unit to complete installations.	www.almex.nl/en	Yes
AviVet	Offers poultry veterinarian consulting, research, training and solutions.	www.avivet.nl/en/home	No
BINCX	Produces and installs shell steel – and concrete structures in agricultural and utility construction.	https://bincx.nl/?lang=en	Unknown
Biochek	Provides an accurate, reliable and easy-to-use animal health monitoring system for the poultry and swine industry, and associated diagnostic solutions for Food Safety testing.	www.biochek.com	Yes
Bolidt	Specialist in flooring for the poultry industry.	www.bolidt.com/en/poultry-industry	Unknown
Cagemax	Trading company that is the pivot between supply and demand of processed animal proteins and fats.	www.cagemax.com/index.php	Unknown
Celtic Cooling	Designs and installs energy-efficient and environmentally-friendly refrigeration systems, air conditioning systems and turnkey solutions.	www.celtic.nl/en/home	Unknown
Coolfinity	Offers cooling solutions in case of poor power supply conditions.	https://coolfinity.com	Unknown
De Heus	International leading producer and exporter of complete ranges feeds, concentrates and premixes.	www.deheus.com	Yes
Denkavit	Specialist in feed for young animals.	https://denkavit.com/en	Unknown

DSM	Supplier of comprehensive science-based animal nutrition solutions.	www.dsm.com/corporate/home.html	Unknown
Dutch Poultry Centre	Helps you to quickly find the right Dutch business partner. All partners are internationally oriented companies of excellent repute.	www.dutchpoultrycentre.nl/en	Unknown
Fancom	Offers total automation systems for poultry houses to give farmers complete control of all the processes in your houses.	www.fancom.com	Yes
FarmResult	Automatically gather on-farm data and aggregate this into management solutions and advisory systems.	https://farmresult.com/en	Unknown
Foodmate	Offers innovative technology and cost-effective solutions to poultry processing automation.	https://foodmate.nl	Unknown
ForFarmers	Internationally operating feed company that offers Total Feed solutions for conventional and organic livestock farming.	www.forfarmers.co.uk	Unknown
Gasolec	Manufacturer and supplier of Infrared Radiant heaters & lighting systems for poultry & pig houses.	www.gasolec.com	Unknown
GD Animal Health	Supports industrial customers, governments, veterinarians and farmers by providing animal health programmes and laboratory diagnostic services.	www.gdanimalhealth.com	Unknown
Gi-Ovo	Designs, creates and produces logistic solutions as well as packaging dedicated for the egg industry.	https://gi-ovo.com/#	Unknown
HAS Den Bosch	A university of applied science offering poultry and other livestock courses. Also working on poultry research and innovations.	www.hasuniversity.nl	Unknown
HatchTech	Incubation solutions.	https://hatchtech.com	Yes
Hato Agricultural Lighting	Offers lighting solutions throughout the poultry sector.	https://hato.lighting/agricultural-lighting	Unknown
Heering	Offers climate-controlled transport technologies to optimize transport performance from hatchery to farm.	www.heeringholland.com	Unknown
Hendrix Genetics	A multi-species animal breeding, genetics and technology company.	www.hendrix-genetics.com/en	Yes
Hotraco	Offers barn automation and monitoring solutions.	www.hotraco-agri.com/en	Unknown

Impex Barneveld	Supplier of drinking systems and accessories for poultry farming	www.impex.nl/en	Unknown
Innovatec	Specialized in the development of hatchery mechanization.	www.innovatec.com	No
Intracare	Investments in solutions for healthy quality animal production with fewer or no antibiotics.	www.intracare.nl	Yes
Jansen Poultry Equipment	Offers a wide range of poultry systems from layer nests to broiler housing to packaging solutions.	www.jpe.org/en	Yes
Kanters Specialty Products	Specialized in the development, manufacture and supply of liquid nutritional supplements for intensive poultry farming.	www.kanters.nl/?lang=en	Unknown
Kepro	Supplies veterinary pharmaceuticals for preventing and solving health problems with animals.	www.kepro.nl	Unknown
Linco Food Systems	Offers poultry processing equipment	www.baader.com/en/baader_group/worldwide/linco_food_systems_bv_netherlands/index.html	Yes
Marel	Offers advanced technologies for all kinds of poultry processing plants, with manual, semi or fully automated processes	https://marel.com	Yes
Mavitec	Offers complete systems and equipment for the processing/ rendering of animal by-products	https://mavitecrendering.com	Unknown
Meyn Food Processing Technology	Offers poultry processing solutions.	www.meyn.com	Yes
Moba	Offers highly innovative and reliable total solutions for the egg industry.	www.moba.net/page/en	Yes
MSD Animal Health	Development and production of veterinary vaccines	www.msd-animal-health.nl	Unknown
NEPLUVI	Association of the Dutch Poultry Processing Industries and represents poultry slaughterhouses, cutting plants, processors, cold stores and traders.	www.nepluvi.nl/page/19/company-profile.html	No
Nijhuis Industries	Offers water and wastewater solutions for the poultry industry	www.nijhuisindustries.com/industries/poultry-meat-and-agricultural-waste-water-treatment/	Yes
Ottevanger	Specialised in the design and manufacture of equipment and complete installations for the grain-processing and compound feed industry.	www.ottevanger.com	Yes

Palital feed additives	Manufacturer of high quality feed additives.	www.palital.com/en	Unknown
Plukon Food Group	The Plukon Food Group is one of the biggest players in the European poultry market, supplying chicken products and ready meals to leading European food partners.	www.plukon.com	Unknown
PoultryPlan	Offers one innovative, cloud-based software package that clarifies all relevant data within your poultry integration.	www.poultryplan.com	Unknown
Provimi	Supplier of animal nutrition products and services to meet the needs of livestock producers.	www.provimi.nl/gb-gb/Home.html	Unknown
Ridder Drive Systems	Develop a large number of intelligent drive systems that provide control over the climate inside livestock houses and optimize production.	https://ridder.com/en/page/markets/intensive-livestock	Unknown
Royal Pas reform	World's only single-source supplier of integrated hatchery solutions.	www.pasreform.com/en	Yes
Sanovo	Offers complete solution for the egg processing industry.	www.sanovogroup.com	No
Signify	Offers lighting solutions for the poultry sector.	www.signify.com/global	Unknown
Sonac	Leading producer of reliable, sustainable ingredients for the food, pet food and feed industries.	www.sonac.biz	Unknown
Stienen BE	Offers a complete range of housing computers, air control units, fans, alarm systems and management software.	www.stienenbe.com/en	Unknown
Trouw Nutrition	Supplier of innovative feed specialities, premixes and nutritional services for the animal nutrition industry.	www.trouwnutrition.com	Yes
Van Aarsen	Developer, manufacturer and supplier of state of the art machines and complete feed mill and premix plant solutions for the production of animal feed, aqua feed and premixes worldwide.	www.aarsen.com	Yes
VDL AgroTech	Manufactures and supplies equipment for the modern intensive livestock industry. The product range comprises feeding and drinking systems, manure treatment, heating, cooling, ventilation and climate control systems.	www.vdlagrotech.com/en/home	Yes

Vencomatic	Offers solutions in housing, egg handling and climate control for any type of poultry house.	www.vencomaticgroup.com/en	Yes
Viscon	Providing cost effective, hygienic and reliable hatchery automation & In ovo vaccination solutions.	https://visconhatcheryautomation.com	Unknown
Vostermans Ventilation	Offer ventilation solutions for poultry farms.	www.vostermans.com/ventilation	Unknown
Wageningen UR	Universitair research insitute, with special livestock research department.	www.wur.nl/en/Research-Results/Research-Institutes/livestock-research.htm	Yes
Zwanenberg	Leading European producers and exporter of meats, preserved meat, snacks, soups, sauces, vegetarian and vegan products.	/www.zwanenberg.nl/en	No

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