Ministry of Foreign Affairs

SECTOR STUDY DAIRY BANGLADESH

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SECTOR STUDY DAIRY BANGLADESH

REF: PST20BCD03

BANGLADESH
A growing dairy market

2023

Produced for:

Netherlands Enterprise Agency

VetEffecT
Consultancy & Recruiting
The Netherlands

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Disclaimer

Executive summary

Bangladesh is covering a total land area of 148,460 sq. km land (NL=41,543 sq. km) of which 70,1% arable land incl. 6.5% permanent grassland. An estimated 168.8 million people are living in Bangladesh resulting in a population density of 1,092 per sq. km (NL=413 sq/km). The National currency is named taka (BDT) 1 € – 101.547 BDT (Feb 2021). There is 5.64 % annual inflation rate (June 2021). The Corona-19 pandemic had a negative impact on GDP and was reduced to 3.5% in 2020 but having a strong recovery in 2021 forecasted to reach 5.5. As a result, Bangladesh reached lower-middle-income status in 2015 and is on track to leave from the UN's Least Developed Countries (LDC) list in 2026. Bangladesh is considered to be among the next 11 world-wide emerging markets. The country has undergone significant social and economic growth. The level of poverty has dropped, accompanied by increased life expectancy, literary and per capita food intake. Projections suggest that Bangladesh is going to be one of the fastest growing economies by 2050.

Agriculture is a source of employment and livelihood for nearly 1 in 2 adults in Bangladesh and contributes about 14.23% to GDP. Contribution to agricultural GDP comes mainly from crop production (63%) but also from fisheries (23%), as well as livestock and poultry (14%). There are about 15 million farm households in Bangladesh and a further 13 million landless households who work as sharecroppers or farm labourers and the most important staple food crop grown is paddy (rice).

Dairy farming has a long history in Bangladesh. Milk selling and purchasing in Bangladesh started after the Ghosh people migrated from parts of India to East Bengal at the middle of 17th century. The Gosh is a tribe who by tradition buy milk from the farmers and sell the commodities as fresh milk, sweetmeat, chhana, whey, curd, cream and ghee (butter oil) to the city consumers.

According to Bangladesh Dairy Farmers Association (BDFS), there are 1.2 million dairy farms and 9.4 million people directly or indirectly engaged in the dairy sector. On the other hand, in Bangladesh there are 1.48 million dairy farms of which household (small farm) farm dominates over the family (medium) and business farm (large farm). In addition to millions of small-scale farms, Bangladesh also has a growing number of small to large scale commercial oriented dairy farms. In the past 10 years the national milk production increased at last threefold and it is now meeting two-third of the total demand which is estimated at 15.2 billion ltr/year. In 2009–10 fiscal year the annual national milk production was only 2.37 billion ltr, which jumped to 9.92 billion ltrs in fiscal year 2018–19, registering a 319% increase. This volume covers 66% of the national demand which is leading to an availability of 165 ml milk/pp/day whereas 250 ml/milk/pp/day is targeted for. Nearly half of the milk in Bangladesh is produced on the northern region, in the Sirajganj and Pabna districts. Good availability of fodder and several dairy development programs are main reasons for the higher share of milk production from this area.

About 5 to 7% of the total milk produced is distributed via the formal market. The remaining 93% of the total milk production is sold fresh to consumers. Currently around 20 processors are active in the dairy sector with top four are: Milk Vita, Pran Dairy Ltd, BRAC Dairy Food Ltd and Akij Dairy Foods Ltd.

Despite food legislation, adulterations of raw milk is a big problem and remains to a large extent uncontrolled. Several studies and reports are conducted on raw and processed milk and the results are shocking. Despite these publications, milk adulteration remains an ongoing concern. Some of the major adulterants in milk that can cause serious adverse health effects are vegetable fat, thickening agents, urea, formalin, detergents, ammonium sulphate, boric acid, caustic soda, benzoic & salicylic acids, hydrogen peroxide, sugars and melamine. Common parameters that are checked by the processing plant for the pay-out price of raw milk in Bangladesh are the Solid Non Fat (SNF) fat %, protein content and lactometer reading. Adulterants are added in milk to increase these parameters and shelf life of the raw milk.

Beef sector

For a long time, the meat industry remained confined to a very small number of people and the traditional form of meat production nowadays rests on the hands of butcher workers. In general, there is very little knowledge about wholesome meat production and effective utilization of valued slaughterhouse by-products. In the present situation the industry is partly based on end-of-career or cull animals. Most animals are utilized for meat production after losing their economic validity in the primary field. However, there is an increased trend to rear the male calf from dairy herd for meat and for religious sacrifice called Eid-ul-Azha. During this annual religious festival of 3 days, around 100,000 cattle and goats are sacrificed. The concept of meat type animals is yet to take roots in the country. More recently the beef sector has been gaining momentum.

Currently, there are about more than hundred municipalities with licensed slaughterhouses/-points in the country. During the past few years, the establishment of modern abattoir complexes has been proposed and some projects on mechanized abattoirs initiated by public sectors are near completion. Since there is an export potential of Halal meat to Islamic countries, Bangladesh could emerge as a prospective country. If the sector gets proper attention and all of the stakeholders come forward, this sector could develop and provide a strong basis for economic development.

Leather sector

The leather sector is, after the ready-made garments sector, the second-largest contributor to Bangladesh exports. Bangladesh boasts significant livestock and leather production ranking fourth in Asia on bovine and goat products after India, China and Pakistan. Leather from Bangladesh is considered to be of good quality, and leather goods and footwear factories are increasingly able to meet the high demands of western brands, although leather quality consistency remains a challenge due to a lack of investment in modern technology. The damage of hide and skin during flaying and storage of raw hide is still a major issue.

International Aid and Development support

For decades international aid and development organisations are active to support the development of the dairy and beef sector in Bangladesh. In 2019 The World Bank (WB) approved a US$ 500 million credit line to the national government (GoB) to finance the so-called Livestock and Dairy Development Project (LDDP). This credit line is to be used to support GoB plans to scale-up climate smart investments in livestock, recognizing the need to enhance dairy, meat and egg productivity, job creation, export earnings, and public health while minimizing their climate induced vulnerability. Several other development organisations are active in Bangladesh.

Conclusion

Since there is an acute shortage of land in Bangladesh for the various development goals, there are competing claims for land use. Agriculture, being the dominant land use type, is in constant conflict with other uses, urbanisation being among the most important ones, but there are competitions for land within each use type. The shortage of land is so serious that more than 50 percent farmers have become landless and many people are compelled to settle in the undeveloped offshore islands as soon as this appears on the middle of riverbeds or in the offshore areas. The conflict between agriculture and urbanization is the direct result of population increase, as new houses are needed for new families. Agricultural land owned by parents are often converted to homestead for building new houses to accommodate the offspring. The net result is the decrease of total agricultural land and an increase in the number of smaller sized plots.

While Bangladesh has made major progress in agriculture, it still faces major challenges of maintaining food security keeping up with the population growth rate and exposure and vulnerability to natural disasters and climate change.

One of the key challenges is that Bangladesh lacks the institutional framework for inclusive insurance market development, including the re-insurance capacity required for agricultural and disaster insurance. But the Government shows interest in insurance as an effective and cost-efficient instrument to enable farmers to invest in higher value crops and livestock, and mitigate their high vulnerability, thereby complementing social safety nets. However, insurance cannot replace adoption of good production agricultural practices but must be based on modern high-quality production systems, and safeguard for unpredictable events, but is not financially sustainable when the farming systems remain very vulnerable for disturbances even under normal circumstances.

Future outlook for the dairy and beef sector

There is an increased interest in commercial beef and dairy farming due to market demand by the Bangladeshi consumers. Over the last decade, the production and demand for meat has increased significantly due the following reasons:

- Increase in population (from 145.9 million in 2009 to 168.8 million in 2021) and urbanisation.
- People are more aware about dietary diversity, consuming more animal protein.
- The economic growth has led to increased purchasing power of the population, and urbanisation and dietary diversity has created demand for milk, dairy products and meat.
- The demand for milk, dairy products and meat has triggered increased commercial farming, and in particular the young and educated people are increasingly engaged in livestock farming for meat and milk production because of higher profitability.
- There is a growing trend of fodder cultivation to meet the demand of roughage for dairy animals.

Abbreviations

AI	Artificial Insemination
AMR	Anti-Microbial Resistance
BADIP	Bangladesh Agricultural and Disaster Insurance Programme
BB	Bangladesh Bank
BBS	Bangladesh Bureau of Statistics
BDFA	Bangladesh Dairy Farmers Association
BFSA	Bangladesh Food Safety Authority
BMPCU	Bangladesh Milk Producers Cooperative Union i.e., Vita Milk
BSTI	Bangladesh Standards and Testing Institution
BDT	Bangladesh Taka
CAGR	Compound Annual Growth Rate
CETP	Central Effluent Treatment Plant
°C	Degrees Centigrade
DDC	Dutch Dairy Centre
DLS	Department of Livestock Service
EKN	Embassy of the Kingdom of the Netherlands
EAS	Extension and Advisory Service
FAO	Food and Agricultural Organisation
FY	Fiscal year
GDP	Gross Domestic Product
GoB	Government of Bangladesh
G4AW	Geodata for Agriculture and Water programme
HF	Holstein Friesian
IDRN	Integrated Dairy Research Network
IFC	International Finance Corporation
IFCN	International Farm Comparison Network
IFI	International Financial Institutions
ILO	International Labour Organisation
IMF	International Monetary Fund
KG/Kg	Kilogram
Lakh	100,000 units
LDC	Least Development Countries
LDDP	Livestock Dairy Development Project
Mm	Millimetre
MT	Metric Tons
NBG	North Bengal Gray
NGO	Non-Governmental Organisation
NL	The Netherlands
NLDP	National Livestock Development Policy 2007
SDC	Swiss Development Cooperation
SDG	Sustainable Development Goals (of the United Nations)
SNF	Solids- Not Fat
PCC	Red Chittagong Cattle
PMC	Pabna Milking Cattle
Q	Quarter
QBMPS	Quality Based Milk Payment System
UHT	Ultra High Temperature (pasteurised milk)
UN	United Nations
UNIDO	United Nations Industrial Development Organisation
US$	United States dollar
WB	World Bank

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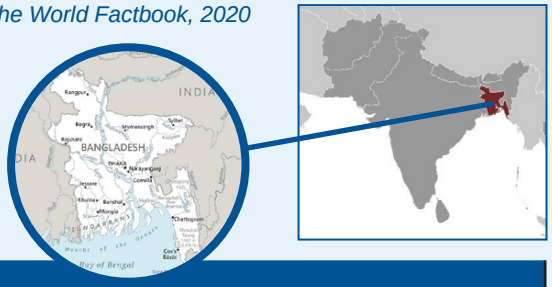


Geography		
Area Total	148,460 sq. km: Land: 130,170 sq. km / Water: 18,290 sq. km	
Agricultural land	70.1% (arable land: 59%; permanent crops: 6.5%; permanent pasture: 4.6%; **forest**: 11.1%; **other**: 18.8%)	2018 est.
Irrigated land	53,000 sq. km	2012
Climate	Tropical; mild winter (October to March); hot, humid summer (March to June); humid, warm rainy monsoon (June to October)	
Natural Resources	Natural gas, arable land, timber, coal	
Administrative divisions	(8) Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, Sylhet	
People & Society		
Population	168.8 million	2021 est.
Population growth	0.98%	2020 est.
Major urban areas	Population DHAKA (capital) 21.741 million, Chittagong 5.133, Khulna 949,000, Rajshahi 924,000, Sylhet 890,000, Bogra 820,000	2021
Ethnicity	Bengali at least 98%, indigenous ethnic groups 1.1%	2011 est.
Language	Bangla 98.8% (official, also known as Bengali), other 1.2%	2011 est.
Religion	Muslim 89.1%, Hindu 10%, other 0.9% (includes Buddhist, Christian)	2013 est.
Urbanization	Urban population: 38.2% of total population	2020
Rate of urbanization	3.17% annual rate of change	2015–20 est.
Literacy	73.9%	2018
Government		
Chief of State President	Abdul HAMID	
Head of Government	Prime Minister – Sheikh HASINA	
Government type	Parliamentary republic	
Capital	Dhaka	
Economy		
Economic overview	The economy has grown strongly since 2005 despite periods of political instability, poor infrastructure, corruption, insufficient power supplies, and lagging economic reforms	
GDP	$329.8033 billion	2020 est.
GDP per capita	$4,200	2017 est.
GDP – composition, by sector of origin	**agriculture**: 14.2%. **industry**: 29.3%, **services**: 56.5%	2017 est.
Exports	$35.3 billion Germany 12.9%, US 12.2%, UK 8.7%, Spain 5.3%, France 5.1%, Italy 4.1%	
Imports	$47.56 billion China 21.9%, India 15.3%, Singapore 5.7%	2017 est.
Legal system	Mixed legal system of mostly English common law and Islamic law	
Currency	taka (BDT) / 1 € = 101.547 BDT	26/02/2021
Inflation rate	4.5%	2019

1 Introduction

1.1 Study background and relevance

On the 17th of December 2020 the Netherlands Ministry of Economic Affairs and Climate awarded the contract to conduct a Sector Study Dairy Bangladesh to a consortium of Dutch and Bangladesh companies lead by VetEffecT, The Netherlands. The study is aimed to map the Bangladeshi livestock sector (milk & meat), its key actors and linkages, trends, issues challenges and (business) opportunities. It is expected that the outcome of the study will:

- Provide to-the-point details for Dutch companies and institutes active in the dairy value chain to elevate the dairy sector of Bangladesh through investments and/or knowledge and technology, and;
- Provide further insight and pave ways for interventions to support relevant supervisory, facilitating and regulatory bodies and key chain actors in Bangladesh;
- List incentives and opportunities available to attract foreign investment in Bangladesh;
- List laws, regulations and policies that are important to know for foreign investors.

The overall purpose of this study is to realise growth and development in the dairy sector of Bangladesh in a sustainable and responsible manner.

The Dutch government has designated Bangladesh as a transitional country where the focus is on promoting aid to trade programmes. Under the Multi Annual Strategic Plan 2019–2022 the Embassy of the Kingdom of the Netherlands (EKN) intends to deepen its support to food security and economic cooperation activities.

This sector study is part of a series of market scans commissioned by EKN in 2019 and 2020, which in combination aim to provide a full, reliable and up-to-date overview of opportunities for commercial delivery of NL expertise and technology as well as investment opportunities for the sustainable development of the BD water- and agriculture sectors.

The Netherlands, with its knowledge and technologies, could play an important role in tackling the future challenges faced in the dairy sector, while positioning itself as partner for the local private sector in exploring market opportunities.

1.2 Methodology

First, the team started with data collection, such as internet research and collection of existing resource and reference reports and materials in the Netherlands and in Bangladesh. Existing reports and information available from previous project and report were collected. The team did not only look for dairy information alone, but also take into account publications or projects when relevant for sustainable development of agriculture, such as the Geodata for Agriculture and Water (G4AW) programme[1] or water efficiency in agriculture.[2] The team also conducted also literature search to identify any important academic papers relevant for dairy and beef sector development in Bangladesh.

The data collection was followed by an **analysis of data**. Where needed, we used triangulation of data: comparing information from different sources and stakeholders should elucidate the most accurate estimate of information that cannot reliably be sourced form databases, such as financial information on farmer costs & revenue. The analysis of the data focused on presenting the outcome with regard to the identification of business and development opportunities for Dutch agribusiness.

(1) https://english.rvo.nl/news/g4aw-reaches-1-million-users-milestone
(2) https://english.rvo.nl/news/business-cases/turning-waste-energy-public-private-partnership

*A crucial part is/was considered to be a **field visit to interview key stakeholders** in Bangladesh. Due to COVID-19, it was anticipated that a fact-finding mission would not be possible in Q1 2021. However, we were confident that a great share of the Bangladesh research mission work already could start remotely, by data collection and interviews executed by our Dutch experts by teleconference, or by our local experts, who are fully acquainted with key dairy stakeholders in Bangladesh. The use of the existing data sources, especially with the Integrated Dairy Research Network (IDRN) would provide a strong base as an alternative for primary data collection. When the mission to Bangladesh will be possible, our Dutch expert can then confirm, and where needed complement the dairy sector information. We consider that the mission to Bangladesh should not only serve data collection but also to identify and where possible to initiate preparatory work for investment, knowledge generation, networking and technology opportunities for Dutch business and institutions based on the dairy sector analysis.*

The fact-finding report will subsequently be **disseminated by publishing of report and presenting the report** in person in Bangladesh and in the Netherlands or by webinar, including engagement in discussing follow-up activities and possible interventions) with EKN Dhaka and other interested Dutch and Bangladeshi parties. VetEffecT is member of the Dutch Dairy Centre[3] that has more than 40 members in the dairy supply chain and also our experts are very well embedded in Dutch dairy business, knowledge and education institutions to maximise dissemination of the study results.

1.3 Additional Country facts and figures

Regions and administrative divisions

Traditionally Bangladesh is divided between four regions along the fertile Ganges-Brahmaputra delta; formed by the confluence of the Ganges and Meghna rivers, i.e.:

- Northern Bengal: comprising Rajshahi Division and Rangpur Division.
- Eastern Bengal: also known as Eastern Bangladesh, comprising Chittagong Division, Sylhet, Division [and proposed Comilla Division] known for the Surma- Meghna River System.
- Central Bengal: also known as Central Bengal Region, comprising Mymensingh Division and Dhaka Division (excl. proposed Faridpur Division).
- Southern Bengal: comprising Barisal Division, Khulna Division and proposed Faridpur Division.

The country is divided into eight administrative divisions, each named after their respective divisional headquarters: Barisal (officially *Barishal*, Chittagong (officially *Chattogram*), Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet. Divisions are subdivided into districts (*zila*). There are 64 districts in Bangladesh, each further subdivided into *upazila* (subdistricts) or *thana*. The upazilla is again subdivided into union and village (the lowest administrative unit).

Figure 1 | *Regions in Bangladesh. Source: Wikimedia*

(3) https://dutchdairycentre.com/

Climate

Bangladesh's climate is tropical with a mild winter from October to March, and a hot, humid summer from March to June. The country has never recorded an air temperature below 0 °C. A warm and humid monsoon season lasts from June to October and supplies most of the country's rainfall. Natural calamities, such as floods, tropical cyclones, tornadoes, and tidal bores occur almost every year, combined with the effects of deforestation, soil degradation and erosion.

Figure 2 | *Average monthly temperatures and rainfall of Bangladesh for 1901–2016. Source: highcharts.com*

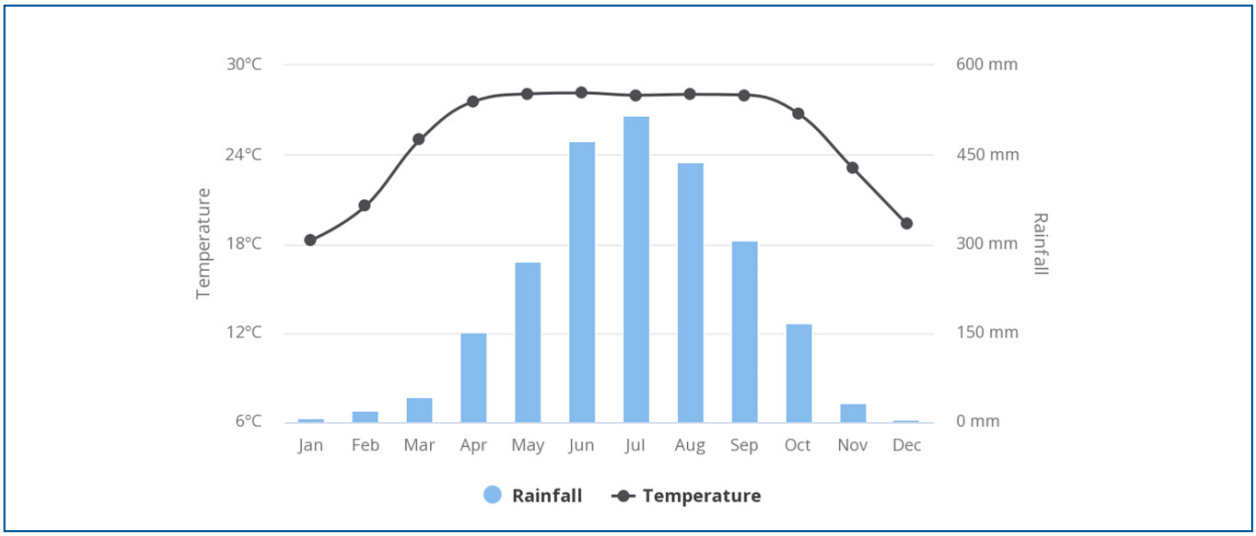
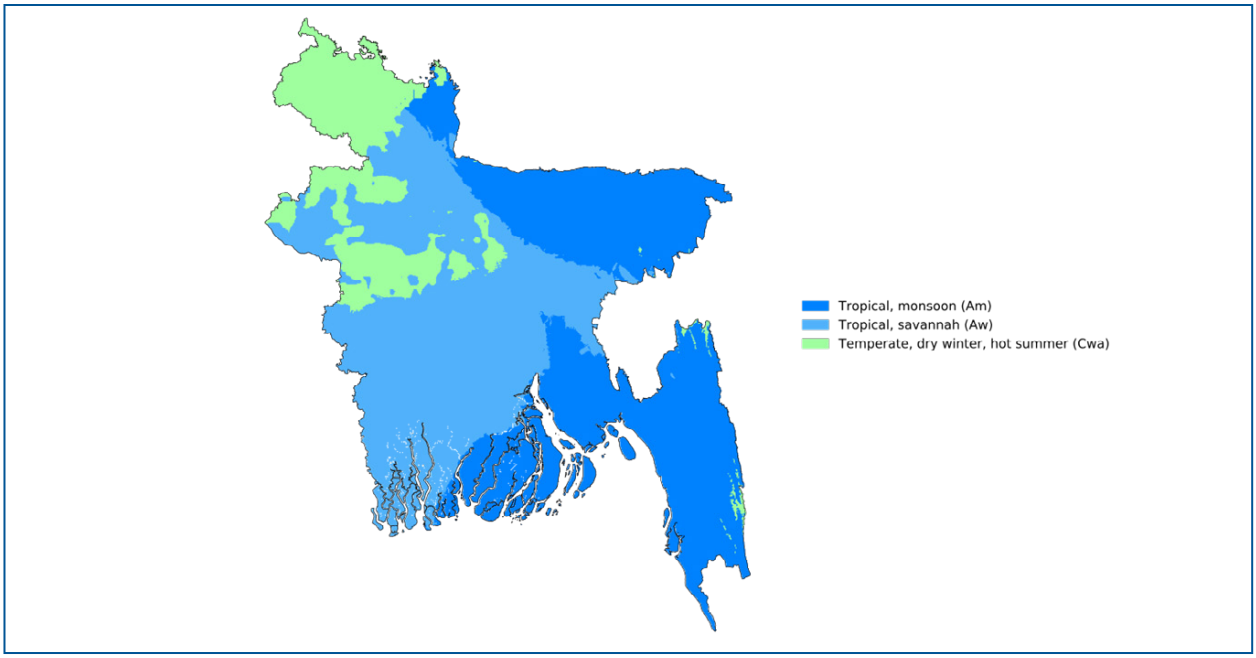


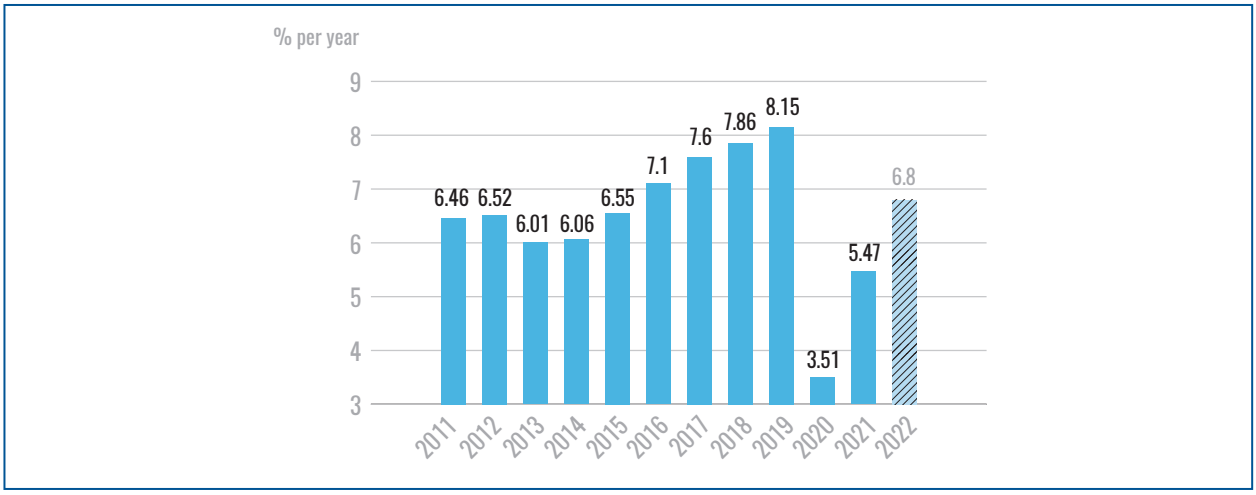
Figure 3 | *Köppen-Geiger climate classification map for Bangladesh (1980–2016). Source: Wikipedia*



National economics

Bangladesh achieved an impressive annual Gross Domestic Product (GDP) growth rate of 8.15% in 2019 fiscal year compared to the previous year, being the highest in South Asia which was reduced to 3.51% due to Covid-19. The GDP began to recover and reached 5,47% in September 2021. Industry grew 12.3% (compared to 12.1% in 2018) with manufacturing surging 14.2% (compared to 13.4% in 2018) while services advanced 6.8% (compared to 6.4% in 2018). Meantime, agriculture growth slowed to 3.9% (compared to 4.2% in 2018).[4]

Figure 4 | *Gross Domestic Product (GDP) growth rate. Sources: GDP growth rate 2011–2021: tradingeconomics.com; GDP growth rate projection for 2022: Asian Development Bank*



The Corona-19 pandemic had a negative impact on GDP and was reduced to 3.5% in 2020 but recovered markedly, and is forecasted to reach 5.5% in 2021 and 6.8% in 2022.

Strong consumption, public investments and increased remittance flow up to US$ 14.9 billion (equivalent of up to 5% of GDP) have been contributing to the growth in the country, and in turn is resulting in a sharp increase in domestic consumer demand. This is also an indication of prosperity as local citizen begin to show an obvious preference for better quality goods and in greater volumes.

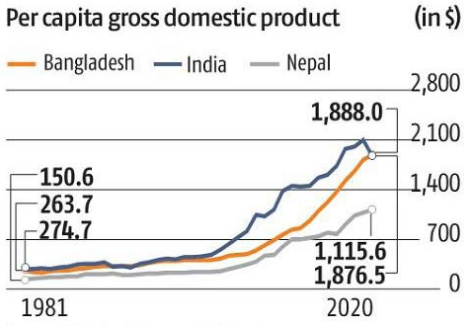
As a result, Bangladesh reached lower-middle-income status in 2015 and is on track to graduate from the UN's Least Developed Countries (LDC) list in 2026. Poverty declined from 44 percent in 1991 to 15 percent in 2016, based on the international poverty line of US$1.90 a day (using 2011 Purchasing Power Parity exchange rate). Moreover, human development outcomes improved along many dimensions.[5]

Bangladesh is considered to be among the next 11 world-wide emerging markets. The country has reflected both social and economic growth. The level of poverty has dropped, accompanied by increased life expectancy, literary and per capita food intake. Projections suggest that Bangladesh is going to be one of the fastest growing economies by 2050. The National Government is making substantial efforts to maintain macroeconomic stability, strengthen revenue mobilisation, tale energy and infrastructure reforms, and improve existing labour skills. The country is also working on economic governance, urban management and adapting to climate change.

(4) Bangladesh Bank
(5) Bangladesh Overview (worldbank.org)

Figure 5 | *Bangladesh growth projections. Source: IMF*

ADB' revised growth projections for South Asia		
	2020	**2021**
Afghanistan	-4.50%	3%
Bangladesh	4.50%	7.50%
Bhutan	2.40%	1.70%
India	-4%	5%
Maldives	-11.30%	13.70%
Nepal	2.30%	3.10%
Pakistan	-0.40%	2%
Sri Lanka	-6.10%	4.10%



Bangladesh is urbanizing fast. By 2030, 48% of the population will live in towns and cities. Most will be young, energetic and digitally connected. They will be agile, receptive to new ideas and look for new ways of creating wealth. In fact, this is already happening with over 110 million active internet subscribers in Bangladesh. By 2025, mobile internet penetration will reach 41% population. Rapid urbanization, fed by increasing consumption of electricity and more than 30 million middle class citizens, is indeed becoming a huge market. As a result, Bangladesh has the fifth-largest internet user population in Asia-Pacific. The country is moving towards a cashless society.

Although more than half of GDP is generated through the service sector, 37.75% of people in Bangladesh are employed in the agriculture sector in 2020 with rice as the single-most-important product. Agriculture production is no longer about subsistence. Beyond self-sufficiency, the country is now the seven-largest rice producer, second-largest jute producer, third-largest mango producer, fifth-largest in vegetable production and fourth-largest in inland fisheries in the world.

Today, Bangladesh offers among the most liberal investment regime in South Asia – in terms of legal protection of foreign investment, generous fiscal incentives, concessions on machinery imports, an unrestricted exit policy, full repatriation of dividends and capital on exit.

2 Background on the dairy and beef sector

2.1 Historical development of the dairy and beef sector

Dairy sector

Dairy farming has a long history in Bangladesh. Milk selling and purchasing in the East Bengal (present Bangladesh) started after the Ghosh migrated from parts of India to East Bengal at the middle of 17th century. The Gosh is a tribe who by tradition buy milk from the farmers and sell the commodities as fresh milk, sweetmeat, chhana, whey, curd, cream and ghee (butter oil) to the city consumers.

The Gosh colonies in Shatkhira, Sirajgonj and Chittagong are still engaged in the dairy business. The local Red Chittagong cows were used for this purpose. The cows were yielding 2–4-liter milk per day/cow. One of the oldest veterinary hospitals was identified in Chittagong and was established in 1890. Similarly, the Ghosh of Pabna and Khulna districts were used to marketing milk and milk products in Kolkata. However, the transition from the traditional Gosh system from single objective oriented to multiple objectives (not doing own business but also act as milk supplier to the different processing company) has been taking place.

Bangladesh Milk Producers Cooperative Union (BMPCU) i.e., Milk Vita was established in 1974 at Baghabarighat at Sirajgonj district. The cultivation of leguminous forage and feeding cattle with that at Shahjadpur, prominent area of Sirajgonj district has a long history. At the beginning of 1990, farmers adapted the cultivation of high yielding fodder (Napier and others). Artificial insemination centers were extended to different districts and sub-districts in 1974. Mostly, Shahiwal bull semen was used. Farmers started rearing Friesian cross breed cows from the beginning of the 1980s.

By the mid-1980s, Milk Vita had virtually collapsed, with less than 3 million litres of milk collected annually. The problem was attributed to unfair competition from imports flooding in from subsidized over-production in Europe. At that time, whole milk powder was retailing at less than 20 percent of its cost price in Europe and one-third of the cost of milk production in Bangladesh. By the beginning of the 1990s, import taxes were imposed to counter the adverse impact of the cheaper imports. Also, at that time and following the recommendations of the FAO technical assistance team, the Government withdrew from day-to-day management of the dairy cooperative. Professional managers took over, turning Milk Vita into a profitable business.

Up until the early 1990s, Vita Milk used to be the only formal sector that processed and marketed milk from the producers of Bangladesh. Liberalization and market reforms in the 1990s along with increasing demand for milk and milk products accompanying per capita income growth and urbanization and improvements of infrastructure have brought about greater private sector participation in the dairy sectors. However, much of the potential of the dairy industry in Bangladesh remained unexplored with regard to input service delivery to farm activities and involvement of industries in post-harvest processing and marketing of milk.

Although the establishment of the Milk Vita was considered as the key drivers for the dairy development in Bangladesh, Milk Vita has got a number of obstacles during its journey from the inception to till date. Milk Vita is still striving to provide quality milk and milk products to the major urban areas with a goal to extend their services to rural areas. The current management of the Milk Vita as it is not reflecting the real cooperatives rather a mixture of government and cooperatives. To perform in better way, the Milk Vita might need a structural transformation where the real farmers would have scope to play key role and the management board represent the real farming community.

The main turning point for faster growth in livestock with particularly dairy sector was started 2009 after a global milk price shock and China milk scandal in 2008. The government import policy was liberalized during 2007 and 2008 when the global milk price was historically highest in order to ease access to the baby milk and other powder milk to the consumers as local milk production was outpace than the requirement.

With this purview, at the early 2000, government's policy shifting from cheap import oriented to more restricting policy on import and thus developing the local dairy sector. This has paved the way for opening new the opportunities for private entrepreneurs to participate in the dairy production and processing. A number of private organizations took initiatives and started dairy business. Currently around 20 processors are active in the formal dairy sector with top four are: Milk Vita, Pran Dairy Ltd, BRAC Dairy Food Ltd and Akij Dairy Foods Ltd.

As per the Department of Livestock Services (DLS) data, the milk production has increased substantially, and it reached to approximately 10 million ton in 2020 from 1.7-million-ton 2006. The price was not so much responsive as compared with milk production. The feed price is highly volatile and stays always substantially higher than the global feed price. The milk and feed price ratio also vary over the month and year. The IDRN Bangladesh dairy market update results shows that Bangladesh milk price is 43% higher than the world milk price even with this Bangladesh dairy farmers are facing tremendous challenges to make their business profitable. The main driver is feed cost which is 67% higher than global feed price (IDRN 2021).

Beef sector

For a long time, meat industry has remained confined to a very small section of people and the traditional form of meat production rests on the hands of butcher workers. In general, people have very little knowledge about wholesome meat production and effective utilization of valued slaughterhouse by-product. In the present situation the industry is largely based on spent animals. Most animals are utilized for meat production after losing their economic validity in the primary field. The concept of meat type animals is yet to take roots in the country. However, recently the beef sector has been gaining momentum, which unlike dairy, has not long history. The beef sector has been started to grow only during time while India officially bans the export of cattle to Bangladesh during the first tenure of Modi Government of India. With local field experiences, recently the beef farming is taking place instead of beef fattening, which was formerly well know.

At present there are about more than hundreds municipality authorized or licensed slaughterhouses/slabs/points in the country. During the past few years, the establishment of modern abattoir complexes has been proposed and until recently few projects on mechanized abattoirs initiated by public sectors are nearing completion. Since there is an export potential of Halal meat in Islamic countries, Bangladesh could emerge as a prospective country. If the sector gets proper attention and all of the stakeholders come forward, this sector would bloom and provide a strong basis for overall economic development.

2.2 Farming models

According to BDFA, 1.2 million dairy farms are active whereas 9.4 million people are directly or indirectly engaged in the dairy sector. On the other hand, in Bangladesh there are 1.48 million dairy farms of which household (small farm) farm dominates over the family (medium) and business farm (large farm) (Uddin et al., 2020). The farm type available in Bangladesh are depicted in Table 2.

Majority of the dairy cattle farms in the country are private which can be categorized into five different groups, i.e.:

1. *Dairying for home consumption*
   The large and medium size farmers keep 1-3 cows to meet primarily their household demand for milk products, and the surplus being sold in the local market.

2. *Rearing of cows for dual purposes (draught and milk)*
   Households depending mainly on draft power for cultivation usually keep 2–6 cows including both bulls and dairy cows and often have to use their dairy cows for ploughing. During the off season when cows are free from agricultural farm use, they produce milk which is usually sold in the market.

3. *Small-scale dairy farming*
   The small and medium sized households with financial and technical support from the government, NGOs and cooperatives manage to rear 2–5 cows. They usually sell all their milk and milk products in the market. Average milk production in small scale dairy farming is 8 ltr/day.

Table 2 | *Farm type classification at national level in Bangladesh. Source: Uddin et al., 2020*

Farm types*	Household farm (HF)	Family farm (FF)	Business farm (BF)
Farm description	**Household Farm (HF)** is defined as one the income source for livelihoods, mainly consumed at household level and sells the surplus milk.	**Family Farm (FF)** is defined as the farm that operates the farm with goal to earn main source of income for sustaining family	**Business Farm (BF)** is defined as the farm that operates their business based on Return on Investment (ROI).
Herd size/farm			
Bangladesh	1–3 cows	4–16 cows	>16 cows
Global	1–30 cows	31–300 cows	>300 cows
Comparison with traditional classification	Small	Medium	Large
Labour use	Mainly family labour	Combination of both family and hired labour	Mainly hired labour

** This classification can be compared with traditional classification of small, medium and large (Khan et al. 2009) but IFCN classification is more reflective to the farming activities and farm objective as well as economies of scale. In our study, we proposed IFCN classification for the future research.*

4. *Medium sized commercial dairy farming*
   The medium sized household receiving mostly government incentives or cooperative support established dairy farms where they usually rear 6–25 cows for market sale of milk and milk products. Average Milk production in medium scale dairy farming is 60 ltr/day.

5. *Private large commercial dairy farms*
   These commercial operations establish modern dairy farms and keep 26+ cows. Milk production in large scale dairy farming is 140 ltr/day. There are eight government dairy cattle farms throughout the country, basically being used as breeding purposes for supplying of heifers to small-scale farmers.

2.3 National Livestock Development Policy 2007

The Government of Bangladesh (GoB) National Livestock Development Policy 2007 (NLDP) aimed to increase livestock related products by 2.5 to 3 times by the year 2020 to feed the country's growing population. The GoB adopted several policies and promulgated acts to harness the potential of livestock for economic growth and poverty alleviation. The NLDP identified ten critical programs for dairy and meat production development and outlines the need to strengthen institutional arrangements in livestock, with the establishment of a Dairy Board, a Dairy Research Institute, and a Poultry Research Institute. Among the NLDP's programs, the project intended to contribute to dairy development and meat production; poultry development; veterinary services (VSs) and animal health; feeds and fodder management; breeds development; marketing of livestock products; access to credit and insurance to climatic and other risks; and institutional development for research and extension. Per the NDLP, Department of Livestock Service (DLS) role would be enhanced to focus on providing public good services and private sector, NGOs and community-based organizations would be encouraged to provide more of the livestock services including VSs and vaccinations.

The evaluation of NLDP showed that adoption of those policies and strategies would increase milk productivity, increase labour productivity, and decrease cost of milk production as well as increase household income and decrease the poverty (Uddin et al., 2012 and Uddin et al., 2017). The NLDP drafted in 2007 is outdated and needed to be revised to address the current dairy situation and also achieve the self-sustainability in milk production. The Dairy Development Policy has been initiated in 2018 and now it is under final review by the ministry before getting endorsed by the national parliament. Not only this, under the purview of LDDP, the policy has been taken as key agenda which has been working by DLS and FAO. The modern policy adoption which will be treated as an improved policy tools once the revision of the policy is well adopted and endorsed by the government.

2.4 WB – Livestock and Dairy Development project

In 2019 The World Bank (WB) provided a US$ 500 million credit line to the national government (GoB) to finance the so-called Livestock and Dairy Development Project (LDDP). This credit line is to be used to support GoB plans to scale-up climate smart investments in livestock, recognizing the need to enhance dairy, meat and egg productivity, job creation, export earnings, and public health while minimizing their climate induced vulnerability.

The LDPP project will address the key challenges that restrict private sector investments in the livestock industry. It will leverage industry knowledge of IFC's Manufacturing, Agribusiness and Services (MAS) department, which has identified dairy and livestock as a high potential investment industry. IFC has provided a long-term loan with PRAN Dairy (US$15 million) and a pipeline which includes dairy, poultry and feed value chains.

During LDPP project preparation, majors risk factors are identified being faced by private sector agribusinesses at large, including sporadic outbreaks of animal diseases, lack of infrastructure and the capacity of the GoB and service providers to contain diseases and food safety risks.

The project will strengthen DLS' capacity by financing required infrastructure, skills and knowledge to improve value chains. The project will support a more enabling environment for the private sector to increase business scale by improving value chain integration and enabling consistent, high quality, and safe supplies.[6]

2.5 The leather sector

Bangladesh is the fourth-largest livestock holder in Asia. Smallholders, for whom an animal represents their savings and family assets – just as money in the bank – rear livestock in the countryside. Animals are traded in dedicated livestock markets all over the country. There are no professional slaughterhouses in Bangladesh; animals which are raised for their milk and meat are processed after their productive life by small butchers in the case of castle and usually through home slaughter in the case of small ruminants. This does not constitute a solid basis for hygiene and food safety.[7]

Hides and skins are being traded in a pyramid system where small collectors sell to bigger collectors, who sell to still bigger collectors, ending with traders who sell to the tanneries. Export of raw hides and skins is prohibited. Bangladesh is considered to be a country where good-quality leather is produced, albeit with quality consistency challenges.

The tanneries are, with a few exceptions, situated in the industrial area of Dhaka called Hazaribagh, which is considered one of the most polluted and unhealthy places in the world. Workers are performing their duties in rather challenging circumstances with regard to both their health and labour conditions, which are far removed from basic ILO standards. The Government of Bangladesh has decreed those tanneries must move away from the Hazaribagh industrial area – once on the outskirts of the city but now in the city centre – to a new designated industrial area called Savar, where it has developed a Central Effluent Treatment Plant (CETP). Although this move is under way and a number of tanneries have meanwhile started production in Savar, at the moment of writing this document the CETP is not yet operative. This again creates an environmental challenge, with many people fearing that Savar will become a copy of the present Hazaribagh situation within the next five years. The export is declined in the recent past due to the fact that foreign buyers are very strict to see the number regulations that need to be comply which was taking place but a bit slow. The country has a few medium-sized shoe factories, as well as a number of small leather goods manufacturers, all of which export their products (though only a few to the Netherlands).

(6) WB Appraisal report, November 2018; https://lddp.portal.gov.bd/sites/default/files/files/lddp.portal.gov.bd/download/eaa58664_5074_4f47_9c70_d57c3af90878/2021-01-09-12-59-81d0a88543ebb1ec606a8f4d8ddc0376.pdf; http://www.lrrd.org/lrrd32/5/moham32081.html; https://www.researchgate.net/publication/326376622_Economic_analysis_of_dairy_farming_in_Bangladesh; https://www.google.com/search?q=milk+powder+import+in+bangladesh&oq=milk+powder&aqs=chrome.3.69i57j46j0j69i59j0j69i60l3.21001j0j7&sourceid=chrome&ie=UTF-8

(7) In January 2019 a study on Business Opportunity Scan Leather Sector Bangladesh Commissioned by the Netherlands Ministry of Foreign Affairs, was published Business Opportunity Scan Leather Sector Bangladesh (rvo.nl). Underneath listed information is taken from this study and data and status has been verified by the Dairy sector study team.

The leather sector is, after the Ready-Made Garments sector, the second-largest contributor to Bangladesh exports. Bangladesh boasts significant livestock and leather production ranking fourth in Asia on bovine and goat products after India, China and Pakistan. Leather from Bangladesh is considered to be of good quality, and leather goods and footwear factories are increasingly able to meet the high demands of western brands, although leather quality consistency remains a challenge due to a lack of investment in modern technology.

Growth in recent years has been slow but steady with the exception of 2015–2016, during which period the Bangladeshi leather industry suffered a general setback that in some cases reduced production to 50% of its capacity. The export is declined by 5.42% for crust leather and 49% in leather products. However, there was increased in footwear by 4.54%. This setback was caused by a worldwide reduction in demand for leather goods and footwear, whereas the demand for leather car seats – not produced in Bangladesh – continued to increase. Although setbacks occur periodically, experts suggest that there is substantial room for further expansion of the sector, with the government of Bangladesh providing significant financial incentives for investors in this sector. These developments may provide new or increased opportunities, and in particular for Dutch companies that supply raw materials, chemicals, safety equipment, machines, cleantech solutions and design, among other things. The research performed for this business scan suggests that there are also opportunities for the agro and food safety sectors upstream of the leather value chain.

2.6 Impact of COVID-19 on the dairy and beef sector

Alike any other country in the world, also the economy of Bangladesh was hit hard. With only 15% of the country's population making more than US$6/day, the country stands in a vulnerable position to tackle the economic impact of Covid-19. According to the International Monetary Fund (IMF), the real GDP is projected to decrease to 2% in 2019–20 driven by readymade garments exports, lower private investment growth and wider disruptions due to Covid-19. Against this, the real time GDP for 2020 was 3.51% and for 2021 it reached so far 5.47% which suggests that the government was able to control the economic development amide the Covid-19 pandemic.

The impeding economic recession hitting the Golf and Western countries places a big threat to the wage earners remittance inflow, one of the main pillars of economic growth. In accordance to the Bangladesh Bank, the remittance inflow reduced by more than 600 million US$/year. Decreased demands on poultry, dairy and fisheries products have led to a drastic price drop in prices i.e., egg price fell 45%, milk price dropped around 35%. On top of that, due to industrial shutdowns, garments workers and urban day labourers lost their jobs and moved from the cities to villages pushing the rural economy at a vulnerable level.

DLS as well as the International Farm Comparison Network (IFCN) forecasted a negative trend in the National milk production for 2019/20 as well as 2020/21 due to the lower milk prices and set-back in the national economy. Estimated growth in national milk production will drop from the predicted 5.5% to <1.5 %. The milk production growth as forecasted for negative growth was not happened although the growth of milk production is declined due to Covid-19.

2.7 Development activities by International Donors

For decades international Aid and development organisations are active to support the development of the Dairy and beef sector in Bangladesh. Underneath a short summary is proved on main development Agencies and their main activities in Bangladesh.

Table 3 | *Donors, development organisations and key activities*

No	Name of Donor	Activities and objectives
1	**World Bank, United Nation**	The Livestock and Dairy Development Project will improve agricultural productivity and market access of 2 million smallholder household farmers and small and medium-scale agro-entrepreneurs. The project will stimulate growth and enable a sustainable, inclusive and safe development of livestock value chains in Bangladesh. It will also address some upcoming issues of the livestock sector such as food safety, environmental pollution and climate change, and animal welfare. A livestock knowledge platform will be developed to provide information and support the sector's development.
2	**USAID**	The USAID Mission in Bangladesh is one of the largest USAID development assistance programs in the world. USAID has been a development partner in Bangladesh since the country's independence in 1971. The Agency currently dedicates its resources to promote democratic institutions and practices; expand economic opportunity; improve health and education services; increase food security and support Bangladeshi efforts to mitigate the impact of natural disasters.
3	**USDA**	The USDA stands for the United States Department of Agriculture. The USDA is responsible for the overseeing farming, ranching, and forestry industries, as well as regulating aspects of food quality & safety and nutrition labelling.
4	**Bill and Melinda Gates Foundation**	Bill and Melinda Gates Foundation is active in Bangladesh particularly for Agriculture (Crop and Livestock as well Fisheries). The Foundation has been giving financial support mainly in the form of research and development grant to Bangladesh.
5	**UKAID/DFID/FCO**	The Department for International Development (DFID) was formerly operated in Bangladesh with its strong involvement in Agriculture. However, the DFID was closed on 2nd of September 2020 and merged with Foreign and Commonwealth Office to create Foreign, Commonwealth and Development Office.
6	**Heifer International**	Heifer International began work in Bangladesh in 2006, focusing on three main value chains: dairy, goat and beef with women farmers in northern Bangladesh to improve sustainability and build their farming capacity through better animal care and cultivation techniques.
7	**Government of The Netherlands**	The Netherlands' development cooperation with Bangladesh helps to improve living conditions of the poor, particularly in three areas: water, sexual and reproductive health and rights and food security. Other priority is labour conditions in the Ready-Made Garments (RMG) sector. Activities align with national policy and development plans. The Embassy of the Kingdom of the Netherlands in Bangladesh creates partnerships, and complements technical assistance with investment funds from international financial institutes (IFI). Furthermore, the Embassy continues to promote and broker Dutch contracts with IFIs, especially in the water sector. The Embassy proactively communicates lessons learned and successes achieved to all stakeholders. Cooperation between the Netherlands and Bangladesh is reinforced by research institutes in both countries. The Netherlands' activities focus on: • more and better access to international markets • strengthening the private sector in low- and lower middle-income countries • promoting trade and investment • fair taxation • making production and marketing chains more sustainable.
8	**Government of Sweden**	The Swedish government mainly offers direct research grant for the young scientists through International Foundation for Science (IFS)-www.ifs.se. Besides this, there is Swedish International Water Institute (SIWI) which makes collaboration in relation to water resource management although there is no success collaboration documented yet.
9	**Government of Switzerland**	Currently the Swiss Development Cooperation (SDC) implements phase II of the Bangladesh Agricultural and Disaster Insurance Programme (BADIP). See page 44.
10	**Solidaridad**	Supported by the Embassy of the Kingdom of Netherlands, Solidaridad has been implementing the "Sustainable Agriculture, Food Security and Linkages phase II (SaFaL-II)" project since July 2017 in coastal region of Bangladesh. SaFaL-II has been working to promote adoption of sustainable agricultural practices and market linkages for production and consumption of healthy food for the rural and urban consumers. By stimulating ecosystem based agricultural production and market uptake of safe and healthy food (Annex 1).

3 Dairy sector

3.1 Dairy value chain

The number of dairy cattle in Bangladesh is slowly increasing from 23 million head in 2011 to nearly 25 million head in 2022 (see Table 4 and Figure 6). The number of buffalo show a very small increase, from 1.44 million head in 2011 to 1.5 million head in 2022 (see Figure 7).

Table 4 | *Livestock population ('000 number). Source: DLS 2022 (http://www.dls.gov.bd/site/page/22b1143b-9323-44f8-bfd8-647087828c9b/Livestock-Economy). Accessed Feb 2023*

Name of Species	2012–13	2013–14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Cattle	23.341	23.488	23.636	23.785	23.935	24.086	24.238	24.391	24.545	24.700
Buffalo	1.450	1.457	1.464	1.471	1.478	1.479	1.486	1.493	1.500	1.508
Sheep	3.143	3.206	3.270	3.335	3.401	3.468	3.537	3.607	3.679	3.752
Goat	25.277	25.439	25.602	25.766	25.931	26.100	26.267	26.435	26.604	26.774
Total Ruminants	**53.211**	**53.590**	**53.972**	**54.357**	**54.745**	**55.133**	**55.528**	**55.926**	**56.328**	**56.734**
Chickens	249.011	255.311	261.770	268.393	275.183	282.145	289.283	296.602	304.106	311.800
Ducks	47.254	48.861	50.522	52.240	54.016	55.853	57.752	59.716	61.746	63.845
Total Poultry	**296.265**	**304.172**	**312.292**	**320.633**	**329.199**	**337.998**	**347.035**	**356.318**	**365.852**	**375.645**

Figure 6 | *Total cattle and buffalo population. Source: DLS 2022*

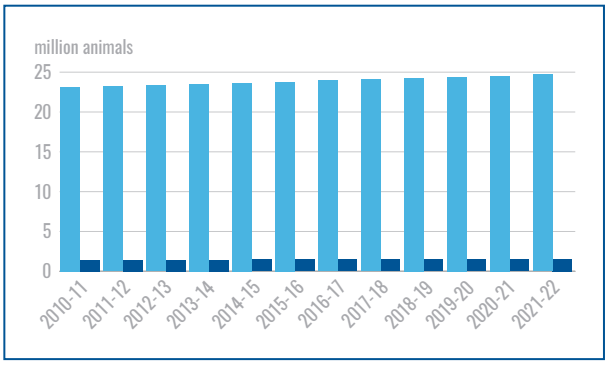
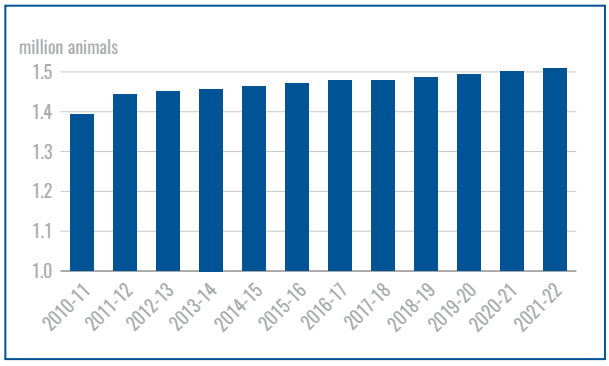


Figure 7 | *Total buffalo population. Source: DLS 2022*

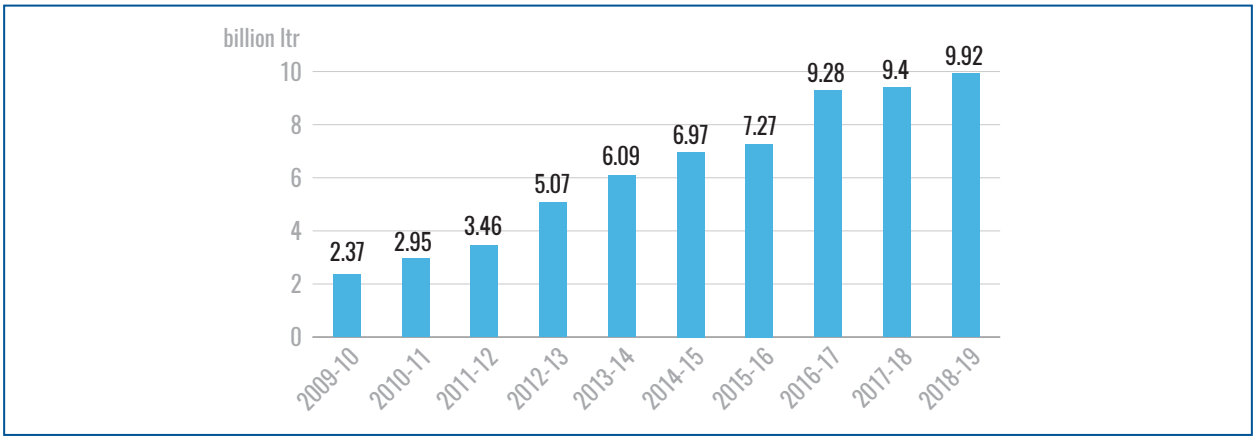


Milk production of cows and buffalo's data on production levels/cow

In the past 10 years the national milk production increased at least threefold and it is now meeting more than two-third of the total demand which is estimated at 15.2 billion ltr/year. In 2009–10 fiscal year the annual national milk production was only 2.37 billion ltr, which jumped to 9.92 billion ltrs in fiscal year 2018–19, registering a 319% increase. The national production slowly increases and the available amount of milk per inhabitant is according to DLS in 2022 208 ml milk/pp/day of the 250 ml/milk/pp/day that is targeted for.[8,9]

(8) Bangladesh Second Country Investment Plan Nutrition-Sensitive Food Systems (CIP2 2016-2020) – Monitoring Report 2020.
(9) http://dls.portal.gov.bd/sites/default/files/files/dls.portal.gov.bd/page/ee5f4621_fa3a_40ac_8bd9_898fb8ee4700/2022-07-18-03-43-37d18965a6458cda3c542ab146480962.pdf

Figure 8 | *Annual national milk production. Source: DLS*



DLS as well as the International Farm Comparison Network (IFCN) forecasted a negative trend in the National milk production for 2019/20 as well as 2020/21 due to the lower milk prices and set-back in the national economy. Estimated growth in national milk production was predicted to drop from the 5.5% to <1.5 %.

However, the real growth for the 2020 was much higher than forecasted milk production as published by DLS (7.7% growth) but the IDRN growth was only 1.8% due to Covid-19.

> Powdered milk imports soar on rising demand: *"Milk consumption is increasing as people's disposable income is on the rise on the back of steady growth of the economy, said a senior official of consumer goods division of Abul Khair Group, which sells the Marks brand powdered milk. Imports are rising at a time when the domestic dairy industry is struggling amid the health safety concerns created for presence of antibiotics and heavy metal lead in some samples of pasteurised and raw milk above the acceptable limit".*
>
> (The Daily Star, Jul 30, 2019)

Specialised dairy farms

In addition to millions of small-scale farms, Bangladesh also has a growing number of small to large scale commercial oriented dairy farms, see Table 5.

Large scale farming

Some farms do even more than 1,700 head of cattle i.e., the Governmental Central Breeding and dairy farm at Savar, Dhaka. Other large-scale farms are amongst others Nahar dairy with 1,200 head and Dutch Dairy Limited (1,100 head of cattle). See Annex 2 for a list of the top 15 large scale farms.

Table 5 | *Specialised dairy farms in terms of farm size and cattle numbers. Source: DLS*

Farm size (Nr of milking cows)	Farm numbers
10–25	4,094
25–50	3,012
50–100	312
100–250	113
>250	10

The feed price is highly volatile and stays always substantially higher than the global feed price. The milk and feed price ratio also vary over the month and year. The IDRN Bangladesh dairy market update results shows that Bangladesh milk price is 43% higher than the world milk price even with this Bangladesh dairy farmers are facing big challenges to make their business profitable. The main driver is feed cost which is 67% higher than global feed price (IDRN 2021).

Regions which have sufficient land to grow forage

Regions which have sufficient land to grow forage to sustain a family based dairy farm for 20 to 40 milking animals includes the following six fodder growing districts, i.e.: Rangpur, Dinajpur, Kurigram, Jessore, Pabna, Sirajgonj.

Conclusion

Development of the dairy sector in the recent past has got the highest momentum especially with the implementation of the government and World Bank (WB) funded project, called Livestock and Dairy Development Project (LDDP). The dairy sector has been also expanding as the number of business and corporate farming is taking place and the relatively young professional are being attracted to become entrepreneur for set up new dairy farms. The relatively new but extremely important of areas of dairy economics is also gaining its importance which would support by generating the latest knowledge on economics in dairy farms. As dairy is becoming viable options the commercial enterprise, the need of the real time and up-to-date knowledge on farm management is also increasing. At the same pace, the technological progress in terms of mechanization of the management, increase the use of digital-based apps, and more dynamic in the communication among various stakeholders. Bangladesh needs to identify the way forward to establish a viable solution for further enhancement of the dairy sector, in balance with other domestics needs.

New entrepreneurs are entering the dairy farming sector and many existing farmers are focusing on improving productivity of their cows through artificial insemination, providing better care and proper feeding. In addition, milk processors such as Milk Vita, Pran and Aarong are supporting farmers. Many educated youths have started cattle farming for milk and meat production in the last five years. The Department of Livestock Services (DLS) also registers increasing farming activities. Some 58,590 farms, each with 10 or more cows, have registered with DLS for dairy purposes till now. Of those, 155 signed up since July this fiscal year, according to DLS.

> New dairy zones have emerged in Gazipur, Savar, Rangpur and great Jessore in the last several decades apart from the traditional milk production Pabna-Sirajganj area, according to two officials of DLS.
>
> *"Overall farming is rising as demand for milk and milk-based products is growing in urban and semi-urban areas,"* said DLS Assistant Director (Farm), ABM Khaleduzzaman. *"Previously, cattle farming had been limited to smallholders in rural areas. This has changed in recent years. Dairy farms have been established in urban and suburban areas,"* he said, adding that *"more than 1,000 cattle farms have been established in areas surrounding Dhaka city, particularly in Dhaka's outskirt Keraniganj. This is because farmers did not even consider dairy as their profession like they do farming. Even today in the villages, farmers consider the cows to be the responsibility of their wives while they concentrate on the bulls, which they can use for ploughing land."*

Milk and meat production

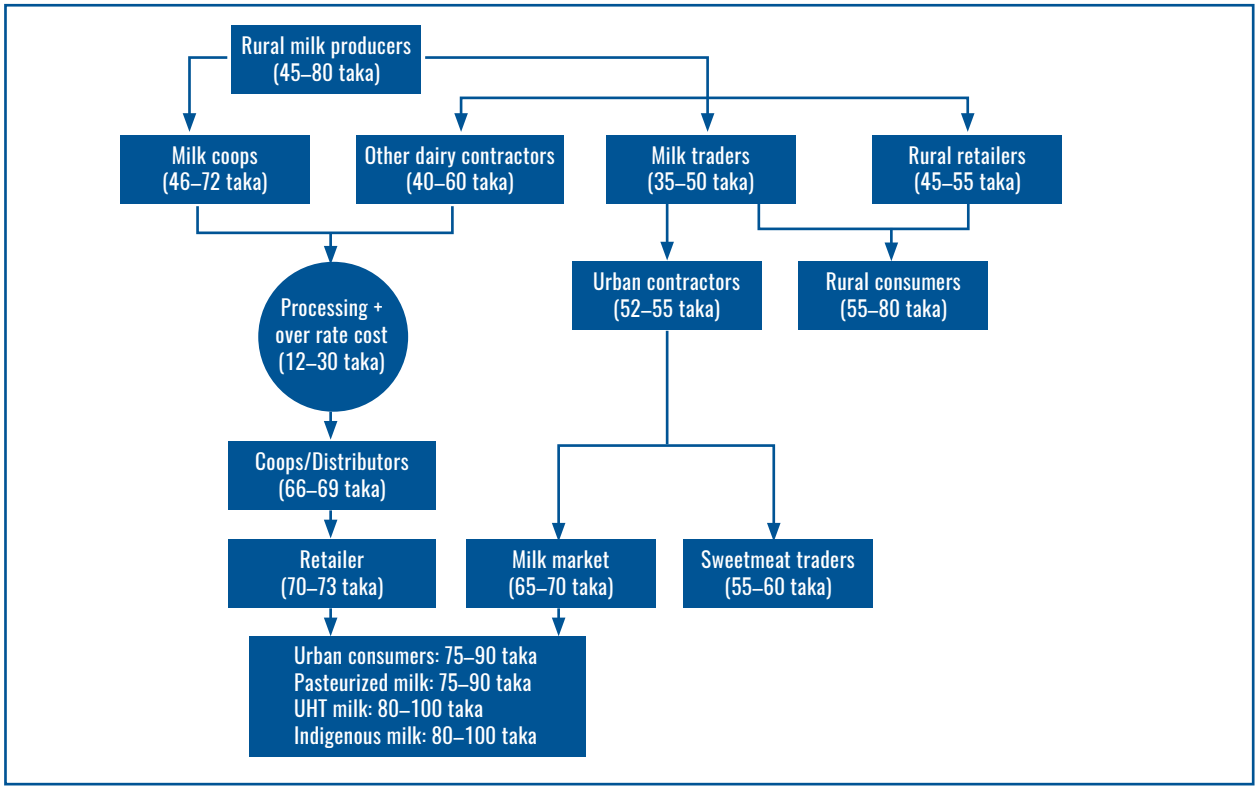
Table 6 | *Demand and per capita availability, demand and supply coverage in 2021/22*[10]

Products	Production	Demand	Coverage (%)
Milk	13.07 MMT (165.07 ml/day/head) 208.61 ml/day/head	15.67 MMT (250 ml/day/head)	83.04%
Meat	9.27 MMT (147.84 gm/day/head)	7.52 MMT (120 gm/day/head)	123.20%

(10) Bangladesh Second Country Investment Plan Nutrition-Sensitive Food Systems (CIP2 2016-2020) -Monitoring Report 2020 and Livestock Economy at a glance, Department of Livestock Services (DLS) available at: http://dls.portal.gov.bd/sites/default/files/files/dls.portal.gov.bd/page/ee5f4621_fa3a_40ac_8bd9_898fb8ee4700/2022-07-18-03-43-37d18965a6458cda3c542ab146480962.pdf

The figure projects that Bangladesh achieved self-sufficiency in meat production, while milk production needs further improvement to bridge the 17% gap between domestic production and demand.

Figure 9 | *Milk flow along with price change in dairy supply chain in Bangladesh. Source: Khaleduzzaman et al., 2021*



3.2 Milk processing sector

About 5 to 7% of the total milk produced is processed and is distributed through to the official market. The remaining 93% of the total milk production is sold fresh to the consumers.

Fifteen major companies produce packaged milk and other dairy products in Bangladesh using modern, industrial manufacturing. Several of them produce a wide range of dairy products, while others focus on the more mass-market products of pasteurized milk, ghee and curd.

The major in industrial and integrated dairy companies, which lead the market, include the government-owned Bangladesh Milk Producers Co-Operative Union Ltd. (BMPCUL) and several other companies with 1% or less market share of milk collected. PRAN, which is the fastest growing of the companies, and Akij are parts of major business conglomerates with activities in nearly every sector of the economy. BRAC belongs to the family of social enterprises operated by the NGO of the same name. Currently 14 companies are registered under Bangladesh Standards and Testing Institution (BSTI). See the Table 7 on next page.

Table 7 | *Dairy companies registered under Bangladesh Standards and Testing Institution (BSTI)*

No	Company name	Abbreviation	Location	Daily Milk collection (in ' 000 ltr)	Market share (%)
1	**Bangladesh Milk Producers Cooperative Limited**	Milk Vita	1. Bangladesh Milk Producers Cooperative Limited, Milk Vita Road, Pollabi, mirpur-6, Dhaka-1216 2. Baghabari, Shahjadpur, Sirajgonj	160	40.4
2	**BRAC Dairy and Food Project**	Aarong Dairy	BDFP Factory, Teen Sarak, Laxmipura, Joydebpur, Gazipur	130	24.0
3	**Pran Dairy Ltd**	Pran Milk	1. Dairy Building, Ghorashal-Palash Rd. Pran Industrial Park, Bagpara, Palash, Narshingdi 2. PRAN Dairy Academy, Shahjadpur, Sirajgonj	125	24.0
4	**Akij Dairy Ltd**	Farm fresh	Akij Food Park: Barobaria, Dhamrai, Dhaka, Bangladesh	42	2.3
5	**Amomilk**	Igloo	Shyampur, Narayangonj	5	0.8
6	**Rangpur Dairy**		Boldipukur, Mithapukur, Rangpur	5	1.1
7	**Aftab and Milk Producer Ltd**	Aftab Milk	Mowchak, Kaliakair, Gazipur	5	
8	**American Dairy Limited**	MOO	Vangnahati, SreepurGazipur, Bangladesh	3	
9	**Baro Awlia Dairy Milk and Foods Ltd**	Dairy Fresh	Dhaka, Sylhet Hwy, Rupganj Narayangonj	4	
10	**Danish Dairy Farm Ltd**	Ayran	Shimrail, Siddirgonj, Narayangonj, Bangladesh	4	
11	**Ichhamoti Dairy and Food Products**	PURA	Savar, Dhaka	5	
12	**Uttar Bango Dairy**	Ultra	Dhaka - Tangail Hwy Chandara, Gazipur	5	
13	**Purbo Bangla Dairy Food Industries**	Arwa	Savar, Dhaka	4	
14	**Tania Dairy and Food Products**	Safe			
15	**Ultra-Shelaidah Dairy**		Dhaka	10	1.84
16	**Bikrampur Dairy**		Dhaka	10	1.84

Table 8 | *Market size by different dairy products. Source: Bangladesh dairy sector database (IFCN, 2020, IDRN, 2020)*

Milk production* (in ' 000 tons)	Year					
	2014	**2015**	**2016**	**2017**	**2018**	**2019**
Butter	1,176	1,069	972	883	803	730
Cheese	47	52	57	64	71	79
Whole milk powder	10,976	9,978	9,071	8,246	7,497	6,815
Skim milk powder	1,188	1,080	982	892	811	737
Condensed milk/Ghee (similar like butter oil) but no condensed milk	1,176	1,069	972	883	803	730

** No data available on volumes plain milk (pasteurised, UHT)*

Plain milk for drinking – pasteurized or UHT – accounts for nearly 90% of the output of the industrial dairy sector. It is estimated that Milk Vita, Aarong and Pran are dominating the pasteurised market with an 80% share and leaving the remaining 20% to their competitors.

In addition to plain milk, the sector produces flavoured milk, butter, ghee, sweet and sour curd, yoghurt, full cream and skim milk powder, mozzarella cheese, Dhaka cheese, labang, lassi, ice cream, sweetmeats, and condensed milk. Certain products come in full cream and low-fat varieties. There are no data on production of plain milk (pasteurised, UHT).

Sweetmeats are the long-standing traditional products produced from milk. This product has special type of sweet taste as milk is processed where table sugar is added to this product. The Sweetmeat is the biggest player in the informal market. Within the milk marketing, the sweetmeat shops alone intake about 55% of the total milk produced in the country.

Table 9 | *Retail prices for various milk and beef products and price trend (in Bangladeshi taka)*

Category	Informal Market			Formal Market			
	2015	2018	2020	2015	2018	2020	2021
Fresh Milk/ltr	40	40	45	55	60	80	80
Pasteurized Milk/ltr	–	–	–	60	65	75	75
UHT Milk/ltr	–	–	–	80	90	90	90
Flavoured Milk/ltr	–	–	–	100	125	125	125
Powder Milk/500 gm	–	–	–	500	550	620–640	300–350
Traditional Sweet/kg	120–150	150–170	170–200	–	–	550–600	550–600

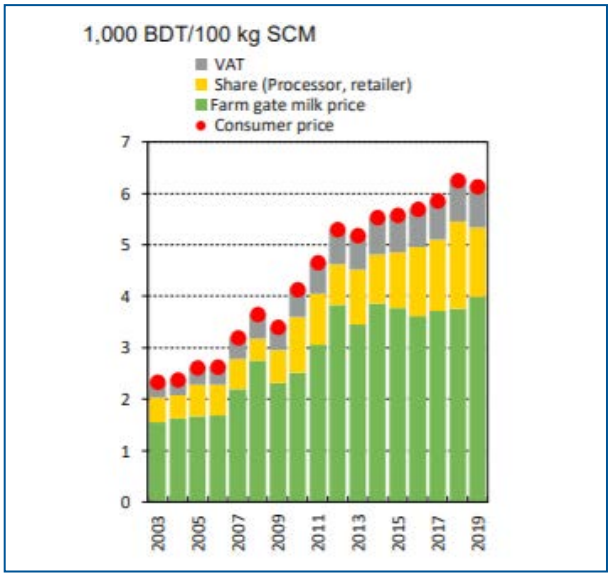
The primary markets for the industrial dairy sector are in Dhaka and the other major urban areas for the country, including the cities of Chittagong, Comilla, Sylhet and Feni. In urban areas, the top selling products include pasteurized milk, UHT milk and flavoured milk, followed by mozzarella cheese (sold primarily to restaurants, including fast food outlets), and yoghurt. In rural areas the top-selling products are ghee and yoghurt, although these areas do not represent viable markets, as the population has access to cheaper local milk, as well as ghee and curd from traditional processors.

The five of the largest companies focusing on sweetmeat production are categorized in the market of traditional dairy products, as they all produce traditional products using manual methods. Some of the larger sweetmeat makers, as well as some of the industrial dairies also have business divisions which produce baked goods such as cakes and cookies, although these are made exclusively with milk powder. Another five or so companies produce sweetened condensed milk, using imported powdered milk.

Companies that focus primarily on the ice cream segment include (listed in order of largest market share) Abdul Monem Ltd, selling under the Igloo brand, Golden Agro Industries Ltd, selling under the Bloop brand; Dhaka Ice Cream Industries Ltd, selling under the Polar brand; and Kwality Foods. Ice cream making companies collect fresh milk from farmers, although the major ingredient to ice cream is powdered milk, both full cream and skimmed milk.

Companies leading in the milk powder market are; New Zeeland Dairy (Diploma), Arla Food (Dano), Meghna Group (Fresh), Nestle Bangladesh (Nido), Partex Group (Danish), Abul Khair Group (Marks), Pran Dairy, Brac Dairy (Aarong) and Milk Vita. Only Milk Vita and Aarong have their own plant for producing milk powder, while other brands do only packaging with imported bulk milk powder. Dano, Nido and Marks are the market leaders.

Figure 10 | *Consumer and farm-gate prices*



Main milk pockets/regions the processing sector is collecting milk from

Nearly half of the milk in Bangladesh is produced on the northern region, where Sirajganj and Pabna district is located. Good availability of fodder and multiple dairy development programs are main reasons for the higher share of milk production from this area.

Few districts are known as milk pocket areas of Bangladesh viz. Sirajganj, Pabna, Natore, Bogura, Rangpur, Satkhira, Khulna and Munshiganj due to the fastest- growing small scale dairying and a good number of dairy farms. See Annex 2 for details on the distance between these milk regions to the locations of the main processing plants.

Current milk price

The sales price of 1 litre (1 qt.) of whole fat milk in Dhaka is 74 taka, however, the national level consumer milk price is for the month of August 55.58 taka/kg while for the farmgate milk price for the same is 52.31 taka/kg (IDRN, 2021).[11]

Table 10 | *Raw milk price (in BDT) of different companies on basis of 4.0% fat (February 2021). 1 Euro = 98.9194 BDT. Source: Bangladesh Bank, Date: 9th of October, 2021*

Processing company	Description	Prices							Effective date	Remarks
		Farmer price	Society manager Commis-sion	Cattle Develop-ment fund	Share purchase	Bonus	Trans-port	Total		
BRAC Dairy	All regions	35.95	1.00	0	0	2.00	1.70	**40.65**	Effective from 20 Feb 2021	
Milk Vita		39.45	1.00	0.65	0.40	1.00	2.61	**45.11**	Effective from 25 Jan 2021	1.05 taka deducts and pay 44.06 taka
PRAN	All hub	36.45	1.00	0.00	0.00	2.00	1.75	**41.20**	Effective from 13 March 2021	
Akij	Pabna	36.45	1.00	0.00	0.00	2.00	1.70	**41.15**	Effective from 06 April 2021	
Akij	Others area	37.15	1.00	0.00	0.00	2.00	1.00	**41.15**	Effective from 06 April 2021	

Milk quality and food safety

Despite food legislation adulterations of raw milk is a huge problem and remains uncontrolled. In the last three years (2018/19/20) many studies and reports are conducted on raw and processed milk and the results are shocking.

Milk adulteration is a serious concern. Some of the major adulterants in milk having serious adverse health effect are urea, formalin, detergents, ammonium sulphate, boric acid, caustic soda, benzoic and salicylic acid, hydrogen peroxide, sugars and melamine. Common parameters that are checked (for payment purpose's) by the processing plant are SNF%, protein content and freezing point. Adulterants are added in milk to increase these parameters.

In order to increase shelf life for long distance transportation of raw milk, formaldehyde is added. This is very toxic causing liver and kidney damages. At one 2020 research project raw milk, pasteurised and UHT milk were tested on the highly toxic and **carcinogenic aflatoxin M1**. In 70% of the raw milk 52% of the pasteurised milk, 20% of the UHT milk aflatoxin contamination was detected. Among all samples, 75% samples where above the EU MRL limit (50 ng/kg) whereas 43% of the samples were below the US and CODEX MRL level of 500 ng/kg).

(11) https://www.google.com/search?q=price+of+milk+in+bangladesh&oq=Price+of+Milk+in+Bangladesh&aqs=chrome.0.0j0i22i30l6.8861j0j15&sourceid=chrome&ie=UTF-8

Although expected, processed milk seems to be also of a poor quality in terms in bacteria count. One research (2019) revealed that five (5) different brands of pasteurised milk did not maintain the standard and acceptable quality as stipulated in the Food standards, i.e., bacterial count is the tested pasteurised milk was ranging from 355 thousand to 1.1 million/ml. 20,000 bacteria count/ml is the standers set by the Bangladesh Standard and Testing Institution. Especially *E. coli* in pasteurised milk indicating considerable health risk. These high level of bacterial loads points out that hygienics practices are not maintained properly at the processing plants. Poor processing technique, improper cleaning of the equipment and lack of knowledge of the workers on hygiene practices contribute to high bacterial loads in pasteurised milk.

Not only processed milk is a health risk, also some common dairy beverages such as Lassi, Labang, Borhani and strawberry milkshakes are hilly susceptible to bacterial contamination. A research in 2019 revealed that high bacterial counts up to 3.6 million are found. Strawberry milkshakes had the highest bacterial count whereas the lowest 176.000/ml was found in Borhani. In the strawberry shake several bacteria were present such as *E.coli, Klebsiella, Proteus, Pseudomonas, Bacillus* and *Streptococcus spp*.

The same research revealed even a more alarming issue, i.e. the presence of multi-drug resistant microorganisms in different samples. Although all strains showed sensitivity to Ciprofloxacin, Gentamycin, Levofloxacin and Ceftriaxon, resistance was observed against either Ampicillin or Colistin. Resistance against Colistin, a third-generation antibiotic, is alarming because in insinuated inappropriate use of drug which might cause the development of resistive in other type of Bactria.

Conclusion

A national milk quality awareness' campaign is needed urgently to be supported by milk quality improvement training and technical assistance programme implemented by processing sector to provide safe milk to the consumers. The concerned government regulatory bodies such as Bangladesh Food Safety Authority (BFSA) and Bangladesh Standard and Testing Institute (BSTI) should be more involved and stringent in monitoring the quality of commercial milk in the market.

Importation

Because of a deficit in domestic production, Bangladesh still has to import a huge amount of powdered milk every year to meet the demand of households and sweets industry, as well as for making value-added products like cheese, butter and yogurt. According to the DLS and BFDA the government and the private sector should investment in having more local milk powder plants in order to reduce to huge volume of imported milk powder.

Powdered milk imports are spiralling on the back of increased demand from a section of consumers on health concerns related to locally produced liquid milk and higher use by sweetmeat, confectionery and ice cream makers, said industry operators yesterday. In the first five months of 2019, milk and cream imports rose 23 percent year-on-year to 75,881 tonnes, according to data from the Bangladesh Bureau of Statistics (BBS). The BBS data reveals that import growth of milk and cream in 2018 was 19 percent.

Figure 11 | *Milk powder import. Source: Bangladesh Daily Star https://www.thedailystar.net/business/import-powdered-milk-almost-doubles-1444687#lg=1&slide=0*

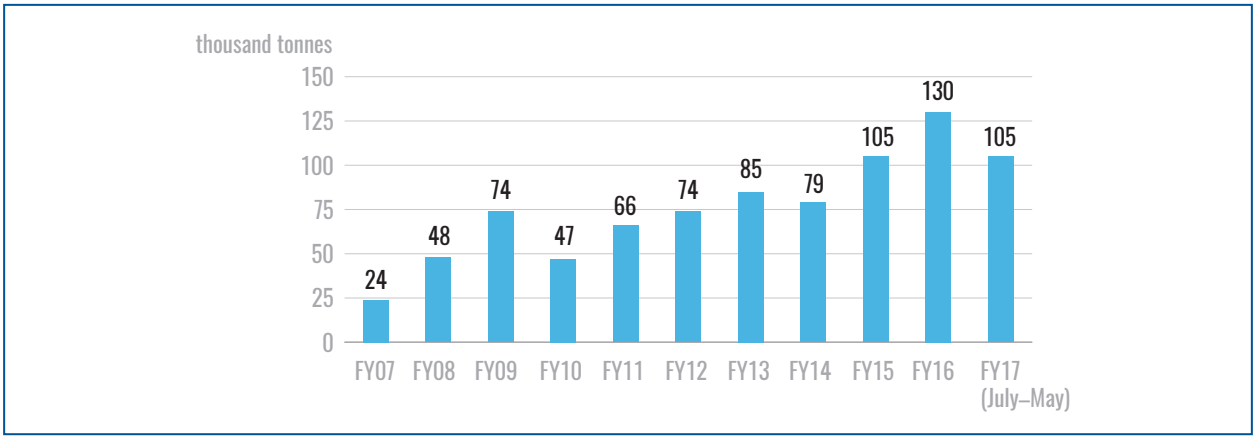


Table 11 | *Dairy products imported by Bangladesh (2018)*

Product	Total value ('000 US$)	Share (%)	Growth (% 5yr)
Whey & milk product	4,721	0.02	156
Cheese & curd	216	0.00	8
Ice cream	95	0.00	76
Milk	83	0.00	112

Apart from powdered milk, Bangladesh also imports other dairy products but in small quantities and values. These products are alike ice cream (US$95,000), cheese and curd (US$216,000) and whey and other milk products (US$4,721,000) account for only 0.02% of the total import value. These imported products are mainly consumed by a limited number of elite consumers in the capital and can be only found in a few supermarkets. As regards export dairy products, only a few products were exported which are so minimal that contributed zero of the export shares.

Only 10 percent of the imported powdered milk is being used as baby food and the rest 90 percent is being used for other forms of consumption. The import of the powder milk is increasing over the time.

Foreign dairy companies active in Bangladesh

Foreign dairy companies active in Bangladesh are several: The topmost brand and very old and popular brand is „Dano" which originally operated in Bangladesh under European milk cooperatives called, Arla Food Ltd. This has wide variety of milk and milk products in Bangladesh. The next is Nestle which has no direct operation on milk but milk related products, various snack, coffee and chocolate are produced under Nestle. The main milk powder is sold as "Nido". The third brand is "Diploma" which is from New Zealand Dairy. is the Fonterra (New Zealand) is selling „Anchor", the Sri Lanka's dairy brand of Fonterra.[12] The Marks Milk powder sold as "Marks" in Bangladesh is sourced from Australia and marketed by Abul Khair Company. Besides this, Abul Khair company has own brand of milk called "Star ship" – liquid condensed and modified milk which is well known and mostly used in Tea preparation at all public places and hotels.

Export

There is no export of dairy products of any significance at the moment.

Milk quality

There is no incentive for **quality milk** supply because individual milk testing is not carried out at the procurement and farmers are paid a flat rate. Adulteration is common leading to a low fat and or SNF (solid not fat) percentage in milk. Measuring sets are not certified by the statutory authority and sets for measuring milk below 500 ml are not available, though supplies below 500 ml are accepted.

Quality control of fresh milk and finished products are far behind consumers' expectations in terms of food safety and sanitation. Consequently, consumers are getting inclined to imported milk and milk products. Quality control measures include only taking a lactometer reading, which reflects the osmolarity and can easily be manipulated. Farmers neither get a price incentive for milk with xi low bacterial load nor get any benefit of bringing milk quickly after milking to the chilling station, the latter practice would reduce bacterial load in milk.

Coordination among actors in the value chain (farmers, traders, processors and service providers) is very weak leading the chain very long with a significant degree of mistrust among participants. This increases cost and reduces competitiveness.

The expected future national requirements of fresh milk are forecasted based on current consumption and assumptions of growth. Milk production is forecast to continue growing at the CAGR achieved during the last decade, of 19.5%. The quantity of local milk procured by the industrial processing segment is forecast to grow at 5% annually – an average forecast, between the 3% growth of the last decade, and the 7% future growth expected by some industry observers. The consumption of milk by traditional processors is forecast to grow at 10% annually; at less than the 19.5% growth of milk production overall, consumption share of the traditional processors will gradually decrease as a proportion of the whole. The remaining milk will be consumed as fresh. The gap between the amount of milk used by processors (traditional and industrial), and that consumed fresh, widens over this time span.

(12) https://www.dairyindustries.com/news/23201/fonterra-announces-bangladesh-partnership/

Table 12 | *Household consumption of liquid milk from 2010 to 2020. Source: IFCN Dairy Sector Database, 2021 and IDRN Dairy Sector Database, 2021*

	Year										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Milk consumption (in ' 000 tons)	470	520	580	605	670	705	780	805	845	757	802
% Total milk production	13%	12%	14%	13%	13%	12%	11%	10%	10%	9%	10%

Alike most developing countries, the dairy value chain has to two main market channels, i.e., the traditional (information and non-regulated) way and the modern (formal and regulated way). It is estimated that around 90% of the national raw milk production of 9.9 billion litres is reaching the consumers via the traditional route whereas 10% is sold in the form of processed products.

In the past traditional milk collectors and sellers, known as Goalas, used to visit households with their milk containers every morning to sell fresh milk; and households used to buy from them. Over the last two to three decades, things have changed a lot. Several industrial processors have emerged – collecting, processing and selling milk and milk products in packaged form with the promise of hygiene and quality. Goalas are still active and dominant in the dairy region). However, if the strict quality control and hygiene milk policy take place, this would decrease the prominence of the Goala.

Today, an increasing number of people are shifting to packaged or powdered milk in their quest for safe food. At the same time, processors have increased processing and expanded their footprints in the urban landscape.

Currently, more than half a dozen milk processors are processing 10 lakh litres of fresh milk daily, which is more than double the amount they could process a decade ago. And organised milk processors, gradually encouraged by business prospects arising out of increasing demand for milk and milk products, are increasing the volume of processing.[13]

Expected future market growth and fresh milk requirements

The expected future national requirements of fresh milk are forecasted based on current consumption and assumptions of growth. Milk production is forecast to continue growing at the CAGR achieved during the last decade, of 19.5%.

The quantity of local milk procured by the industrial processing segment is forecast to grow at 5% annually – an average forecast, between the 3% growth of the last decade, and the 7% future growth expected by some industry observers.

The consumption of milk by traditional processors is forecast to grow at 10% annually; at less than the 19.5% growth of milk production overall, consumption share of the traditional processors will gradually decrease as a proportion of the whole. The remaining milk will be consumed as fresh. The graph below shows the end-market breakdown, based on these assumptions, for 2019 and the next five years. The gap between the amount of milk used by processors (traditional and industrial), and that consumed fresh, widens over this time span.

Table 13 | *Projected demand and supply of milk by 2030 (prior to the COVID-19 pandemic). Source: https://www.researchgate.net/publication/337681662_Feeds_fodder_trend-in_Bangladesh_-AHCAB-2017*

Demand	Production	Availability	Demand	Projected demand 2030	Projected availability 2030
14.86 MMT (250 ml/h/d)	9.28 MMT	157.97 ml/h/d	5.58 MMT	17.69 MMT (250 ml/h/d)	15.6 MMT (225 ml/h/d)

(13) https://www.unido.org/sites/default/files/files/201905/Bangladesh%20dairy%20and%20beef%20vc%20report%20%28Wei%27s%20final%20version%29%20.pdf

4 Beef value chain

In May 2019, the Food and Agricultural Organisation of the UN (FAO) and the United Nations Industrial Development Organisation (UNIDO) published a detailed report on the dairy and beef value chain in Bangladesh. Underneath presented information is taken from that report and is being validated by local experts of the Dairy sector study team.

4.1 Beef production data and the future growth

The meat consumption is Bangladesh has its deep link with its national cultural and religious background. The beef value chain is much shorter and less complicated than the dairies. With minimum influence of beef industries, the majority of cattle are still slaughtered and sold in a traditional way. Wet markets are the most welcome place to purchase beef as it is considered to be “fresh”. However, because of the traditional way of slaughtering, food safety becomes a major concern for beef sub-sector. Although the beef value chain is rather straightforward, the by-products are of equal importance to be considered. Most of the by-products are generated during the slaughtering and butchering process.

In Bangladesh, beef is one of the major diets and the demand for beef often increases sharply during the annual religious festival, particularly Eid-ul-Azha. Throughout the overall beef value chain, there are two main channels: traditional channel and modern channel, reflecting how cattle flows from the fattening stage to slaughtering and processing stage (in traditional and modern ways) and ultimately to end consumers.

Traditional channel: The traditional channel accounts for nearly 93% of the beef supply in Bangladesh, which has remained dominant. Every year beef cattle will experience a surge in demand during important religious festivals, and farmers mainly source their cattle through two ways. On the one hand, the smallholder farmers supply bulls born on their own farms directly to butchers or traders; on the other hand, farms which are close to border areas often obtain cattle from neighbouring country through informal cross-border trade. Traders sometimes have multiple roles, some of them are not only calves’ suppliers, but also important middlemen in terms of transporting beef cattle from farms to slaughterhouses, particularly to urban markets. Both in rural or urban areas, consumers prefer to buy freshly slaughtered beef directly from butchers in the wet markets.

Modern channel: The modern channel is existing in Bangladesh but it is not the mainstream. There is only one company, Bengal Meat, leading the industrial processing sector. The company generally sources cattle from abroad or from particular producer groups. The fresh and processed products are then sold through retail stores, supermarkets, restaurants and hotels. Meanwhile, since the price is not competitive internationally, the company also has difficulties in exporting. As a result, this channel is still being marginalized.

By-product channel – bones: As one of the main by-products, bovine bone is usually separated from the meat and offal during slaughtering and then collected by bone collectors. The bones from the urban markets (such as Dhaka) are almost 100% collected. After chopping and crushing the bones, all the crushed bones will be supplied to gelatin and capsule companies, and will eventually be sold to domestic and foreign markets.

By-product channel – hides and skin: Similar to bones, cowhide is also an important by-product. 100% of the cowhide in the urban and suburban areas is purchased by the hide collectors, and 60% is sourced from rural areas. The hide collectors often maintain a good connection with slaughterhouses and butchers. After collection, all hides are transported and supplied to the tanneries and will be further processed in the leather factories. The final leather products will be sold to national and international markets through global companies or retail stores (UNIDO, 2019).

Table 14 | *Production of meat. Source: DLS; UNIDO*

Products	Unit	Year										
		2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020
Total Meat	Lakh MT	**12.60**	**19.90**	**23.30**	**36.20**	**45.21**	**58.60**	**61.52**	**71.54**	**72.60**	**76.00**	**81.80**
Beef meat	Lakh MT	8.25	13.02	15.25	23.69	29.59	38.35	40.26	46.82	47.52	49.74	53.54
Buffalo meat	Lakh MT	0.71	1.12	1.32	2.04	2.55	3.31	3.48	4.04	4.10	4.29	4.62
Sheep	Lakh MT	0.13	0.21	0.25	0.38	0.48	0.63	0.66	0.76	0.78	0.81	0.88
Goats	Lakh MT	1.59	2.51	2.94	4.56	5.70	7.39	7.76	9.02	9.15	9.58	10.31
Poultry	Lakh MT	1.92	3.03	3.55	5.51	6.89	8.92	9.37	10.90	11.05	11.57	12.46

http://dls.portal.gov.bd/sites/default/files/files/dls.portal.gov.bd/page/ee5f4621_fa3a_40ac_8bd9_898fb8ee4700/Livestock%20Economy%20at%20a%20glance%20%20%282017-2018%29.pdf; https://www.unido.org/sites/default/files/files/2019-05/Bangladesh%20dairy%20and%20beef%20vc%20report%20%28Wei%27s%20final%20version%29%20.pdf

In Bangladesh, beef is one of the major diets and the demand for beef often increases sharply during the annual religious festival, particularly Eid-ul-Azha. Throughout the overall beef value chain, there are two main channels: traditional channel and modern channel, reflecting how cattle flows from the fattening stage to slaughtering and processing stage (in traditional and modern ways) and ultimately to end consumers. Two by-products' channels are shown on this map as well, which reflect how they link to the core beef value chain and how these by-products flow to the corresponding industry chains.

For a long time, meat industry has remained confined to a very small section of people in the country and the traditional form of meat production rests on the hands of butcher workers. These people have very little knowledge about wholesome meat production and effective utilization of valued slaughterhouse by-product.

In the present situation the industry is largely based on spent animals. Most animals are utilized for meat production after losing their economic validity in the primary field. The concept of meat type animals is yet to take roots in the country. At present there are about more than hundreds municipality authorized or licensed slaughterhouses/slabs/points in the country. During the past few years, the establishment of modern abattoir complexes has been proposed and until recently few projects on mechanized abattoirs initiated by public sectors are nearing completion.

Since there is an export potential of Halal meat in Islamic countries, Bangladesh could emerge as a prospective country. Some key drivers are:

- **Ban of Indian Cattle to Bangladesh:** Ban on Indian cattle movement to Bangladesh during early tenure of first Modi's Government during 2014. This had a strong impact on the development of local cattle for beef. Since then, a structural transformation has been taking place in the beef sector, from traditional beef cattle fattening to real beef farming.
- **Government initiatives:** The Department of Livestock Services (DLS) is also providing support to the beef farmers.
- **Quick return:** Unlike dairy, beef provides quick return which is one of the major concerns for increasing beef farming.
- **Consumer's preference:** Bangladeshi consumers prefer beef from local rather than imported.
- **Strong awareness building:** A number of awareness programs has been taking place for consuming local beef. Beef cattle that have been raised by using steroids or other hormones for increasing body weight are discouraged. The nutritional and quality of meat is key arena from the consumer side

Therefore, with the high integration between the beef and dairy value chains at the primary production segment, a majority of the animals slaughtered for beef could be considered by-products/waste of the dairy industry. On the other hand, the Bangladeshi market offers a relatively high return for culled animals, as compared to returns in other countries of the sub-continent. As the revenues earned from the sale of milk are often equal to the production costs of cattle rearing, farmers depend on the sale of culled animals to secure a profit from their cattle rearing activities.

The quantity of beef products which are imported or exported is insignificant. Bengal Meat, the only company operating a modern slaughterhouse in the country, was launched with the intention to export beef. However, only small quantities have been exported to markets in the Middle East, largely due to the inability of the company (working in partnership with the government) to guarantee that the meat confirms with international food safety standards, given the uncontrolled situation of cattle disease in Bangladesh.

Sweetmeat prices ranging from 120 to 280 BDT/kg. Several of the traditional sweetmeat makers have grown into national chains, including sweetmeat companies from India which have opened operations in Bangladesh. Regardless of their size, large companies still use artisanal and manual processing methods. Prices of these premium sweetmeats, made by the larger urban sweetmeat chains, can surpass 650 BDT/kg.

Table 15 | *Prices of sweetmeat. Source: DLS; UNIDO*

Category	Traditional processors (BDT/kg)	Premium Sweets (BDT/kg)
Chom Chom	150–200	604–652
Roshogolla	150–200	430
Kolajam	170–200	430
Sada Dsanadar	130–180	NA
Jamrul	180	478
Pyara sondes	200–220	1,561
Sondesh	320–420	865–952
Barfi Sondesh	280–350	NA
Khir Sondesh	350	865
Katarivog	320	NA
Sponse Misti	200	NA
Roshmolai	180–320	691
Ghee	850–1,000	1,000–1,300
Curd	120–150	150–220

Table 16 | *Retail prices for beef. Source: DLS; UNIDO*

Category	Sold by wet market butchers	
	Rural (BDT/kg)	Urban (BDT/kg)
Meat (mostly with bone)	480–500	500–550
Offal	350–400	220–500
Stomach	200–250	250

https://www.unido.org/sites/default/files/files/2019-05/Bangladesh%20dairy%20and%20beef%20vc%20report%20%28Wei%27s%20final%20version%29%20.pdf; http://dls.portal.gov.bd/sites/default/files/files/dls.portal.gov.bd/page/ee5f4621_fa3a_40ac_8bd9_898fb8ee4700/Livestock%20Economy%20at%20a%20glance%20%20%282017-2018%29.pdf; https://knoema.com/atlas/Bangladesh/topics/Agriculture/Live-Stock-Production-Production-Quantity/Production-of-beef-and-buffalo-meat

5 Facilitating and supporting sectors

5.1 Genetics and breeding

Cattle breeds
Two major types of cattle dominate the Bangladesh dairy industry. Crossbred cattle constitute about 20% and are mainly produced by breeding local non-descript zebu cows and heifers predominantly with Holstein Friesian (HF) and Sahiwal bulls. The most potential local cattle although not described as breed are Red Chittagong Cattle (RCC), Pabna Milking Cattle (PMC) and North Bengal Gray (NBG).

Buffaloes breeds
The buffaloes of Bangladesh are mostly river type although swamp type exists. Indigenous buffaloes are low yielding, but are stout draft animals. These animals can be the foundation for a high yielding milk buffaloes through breeding up with dairy breeds and have an increased milk and meat production of about 0.25 million MT and 40,000 MT per year respectively.

Artificial Insemination (AI)
The government has some breeding farms, which produce semen and distribute it among the farmers through Artificial Insemination (AI) centers. The number of AI centers is insufficient and they offer poor services to the farmers. Government AI and vaccination service respectively can cover only 6.5% and 10% of the demand, respectively. Many important extension works run on project basis: in order words, the service is terminated at the end of the project. For example, a recent project conducted in three Upazillas of northern Bangladesh proved that dairy extension among the common interest groups (CIGs) plays a significant role in poverty reduction. However, the service is no longer continuing due to termination of the project. Therefore, client responsive and sustainable extension services deserve attention of alternative extension providers.

The number of AI done in Bangladesh was 3.21 million in 2019, Department of Livestock Services (DLS) did 2.5 million, BRAC did 713 thousand and BMPCUL did 75 thousand. About 40% of the cattle breeding are covered by AI.

> Emran said improved semen is necessary to increase milk yields. *"Semen import and marketing should be opened up to the private sector. Let there be competition,"* he said demanding authorities make rules to provide information of genomic and progeny tests available to farmers. *"Allow good entrepreneurs to import semen for breed development."*

Recommendations:

- The genetic improvement should be done in systematic way where the accurate data and pedigree recording on AI should be maintained.
- The national policy for genetic improvement need to be implemented.

5.2 Forage production and handling

Land Use Conflicts in Bangladesh

Since there is an acute shortage of land in Bangladesh, still competition among the various land uses is natural. Agriculture, being the dominant land use type, is in constant conflict with other uses. There are competitions for land within each use type. The shortage of land is so serious that more than 50 percent farmers have become landless and many people are compelled to settle in the undeveloped offshore islands as soon as this appears on the middle of riverbeds or in the offshore areas. The conflict between agriculture and urbanization is the direct result of population increase, as new living houses are needed for new families. Agricultural lands owned by parents are being converted to homestead for building new houses to accommodate the offspring. The net result is the decrease of total agricultural land and an increase in the number of smaller sized plots. As the development is going on in all sectors of economy with aid from international agencies, more and more lands are being diverted to development activities for building townships, industries, educational institutions, roads and highways, etc.

Land scarcity, seed unavailability of economic fodder crop, absence of production technology to match with the ecosystem (land, climate, cropping system) and economy of dairy farming are the major factors that affect introduction of a forage crop in an existing farming system. Subsistence farms with close interlinking of crops, livestock and household were the predominant feature in Bangladesh agriculture before the intensification of high yielding variety (HYV) of rice cultivation to meet the increasing cereal demand due to population pressure.

About 67.5% of the total land area is cultivable and covered with single, double and triple crops resulting in a crop intensity of 180%; and 7.4% is cultivable waste. Major crops are of Rice (72.8%), Jute (4.5%), Sugarcane (1,1%) and Wheat (5.3%) respectively. Moreover, population growth along with urbanization has been limiting the total operated and gross cropped area of the country (BBS, 2016), and sparing no additional land for fodder cultivation and squeezing common land, being used mainly for grazing by local animals.

During the last four decades' rice cultivation has been intensified affecting close interlinking of crop, livestock and households. Traditional legume and non-legume crop rotations or crop and livestock integration are replaced by single crop for grain production and affected soil health of many regions of the country. Legume cropping supported livestock keeping and helped soil fertility through recycling nitrogen and facilitating animal grazing during a part of crop cycle, especially, in the winter season.

The long changes in crop production systems have impacts on production performances of farm animals, especially, of large ruminants, and ultimately it has brought a change in production system of animal agriculture in the country.

The competition for land between agriculture and livestock has become very acute. At present there are about 37 million bovine population for which there is no demarcated grassland. This huge bovine population thrives mainly on rice straw and grasses that grow on road and canal side patches and homestead areas. Seasonally the cattle can graze in the agricultural fields during their short lay period. But these fields are rarely available for grazing if they are used for double or triple cropping. Land in Bangladesh has tremendous potential for growing grass and herbs but the main problem is the shortage of land.

Other challenges for fodder production are:

Gradual squeezing of grazing & pasture areas

Due to continuous changes of cropping pattern & HYV rice production, the scope for production of fodder is getting scarce day by day. There is high pressure on land for production of food for human being which is also not enough for ever growing human population. Moreover, more and more land is being utilized for industry, housing and urbanization.

Natural non-synchronization of feed production & availability

Change of cropping pattern: Replacement of pulses and oilseed cultivation by the boro-paddy causes serious reduction of nutritious feed for ruminants e.g. pulse straw, pulse bran and oilcakes.

Loss/otherwise use of crop by-products

The straw and other crop residue used as fuel and other purposes: It is estimated that 30 to 40 percent of the total straw and crop residue are used as fuel and other purposes.

Technology transfer problems
Improper use of non-conventional feedstuffs: Technology has not yet been developed to utilize the non-conventional feed stuff like slaughter house waste, crop residue, food processing for the use of waste.

Competition human with livestock
Livestock farming leads to direct competition for food with human and livestock in the country. The situation is unlikely to be reversed in near future unless country achieve self-sufficiency in food grain production and fodder production proves more profitable to farmers.

Fodder seed bank unavailability at regional level
The most difficult factor for the farmer to continue Napier cultivation is the availability of cuttings. The inundation of Napier fodder land by floodwater requires repeated plantation of the grass every year. This urges supply of Napier cuttings from other sources, that are met at present by the BLRI. The institute in cooperation with the Milk Vita demonstrated farmers to keep cuttings at their homesteads, roadsides and highlands available to other farmers. Farmers use to conserve grass cuttings following the systems. In addition, some farmers of high land area which is not affected by floodwater are trained to raise Napier grass after several cuttings to use as sources of seed for the next year, and in addition to sell seed cuttings to other farmers. This has developed another source of income from Napier grass for the farmers who grow Napier up to maturity after having several harvests of green fodder. It is reported that a farmer may earn about BDT 247,500 from a hectare of land if seed cuttings are sold to other farmers.

See Annex 3 for forage crop seed and seedling selling companies/organisations.

See Annex 4 for total feed production and availability.

Climate change and salinity
Climate change and salinity are the major facing by the country now-a-days. More than 30% of the cultivable land in Bangladesh is in the coastal area. Out of 2.86 M ha of coastal and offshore lands and about 1.056 M ha of lands are affected by different degrees of salinity (Hussain et al., 2012).

Conclusions and recommendations
Livestock is suffering from huge shortage of green fodder. Very little efforts are made for awareness building among the farmers for HYV fodder cultivation. Land scarcity, inadequate extension work and absence of fodder seed bank are main reasons for green fodder shortage in the country.

Recommendations

- Establish infrastructure & manpower capacity in potential AEZs for testing and adopting suitable fodder crops such as saline, shed loving and draught tolerant. To address the feed problems in those areas, salt tolerant native/ natural fodder germplasm would be identified and also collect from national and international organizations.
- Establish capacity for fodder breeding and agronomical trials.
- Adoption and establish facilities for post-harvest fodder and feed technology.
- Strengthening the germplasm conservation facility and establish linkage with national and international organizations and research institutes for exchanging high yielding fodder germplasm.
- Establish capacity for fodder seed production and marketing.
- Fodder production and conservation for chars, bathan and other fodder producing areas.
- Establishment of fodder seed bank/ germplasm Centre in major districts of the country.
- Introduction of fodder into agroforestry system through efficient utilization of land, tree fodder and shrubs.
- Integration of various fodder germplasm matching with the existing cropping systems.
- Establish a research Centre in the name “Fodder & Grassland Research and Development Centre” at the campus of BLRI may support the requirements of the farmers. This Centre will bring benefit for the development of dairy and fattening farms through gradual increase in the number of quality human resources. In addition, local feed problems would be addressed through research and will strengthen the research, training and extension linkage (Sarker et al., 2019).

5.3 Feed industry

Bangladesh dairy industry depends on crop residues (30.7 million MT per year) and by products and cut-and-carry green fodder (2.9 million MT per year). Crop residues commonly available are rice straws, wheat straws, maize, stovers, sugar cane tops and other crop thrash. Main y-products are wheat bran, rice polish, pulse husks and oil cakes.

About 2.9 million MT by-products are produced in the country but only 0.97 million ton is available to feed cattle against a requirement of 2.8 million MT to produce 5.6 million MT milk. The rest of the by-product is used in the poultry (50%) and fisheries (20%).

Over the last two decades, large poultry, cattle and fish farms involved in commercial production have been gaining prominence. Commercial feed production experienced almost 25% growth in last one decade due to the augmented protein demand, which results the launch of many commercial feed mills over the past couple of years. A snapshot of feed mills in Bangladesh is provided below.

Table 17 | *Feed mill numbers*

No	Item	Total Number
1	Total registered feed mills from DLS	198
2	Registered active feed mills (62 are renewed up to September 2018)	96
3	Registered inactive feed mills	102
4	Unregistered active feed mills	33

Top feed mills like Nourish Poultry Feeds, ACI, Kazi Farms, Provita Feed, Aftab Feed, New Hope Feed, Aman Feed etc. are occupying about more than 70% of total market share. A glimpse of market coverage of top feed mills is provided below.

Table 18 | *Market coverage of top 15 feed mills (%)*

No	Name of Company	(%) Coverage
1	Nourish	12.90
2	ACI Godrej	8.60
3	Paragon	7.60
4	United Feed	7.20
5	Kazi Farms	4.70
6	City Poultry	4.5
7	Provita Feed	4.3
8	Aftab Feed	4.0

No	Name of Company	(%) Coverage
9	CP Bangladesh	3.9
10	RRP Agro	3.0
11	Quality Feed	3.0
12	AIT Feed	2.7
13	New Hope	1.7
14	AG Agro	1.7
15	Aman Feed	1.4

In Bangladesh, the market size of total commercial feed stands to be at 5 MMT (million metric tons) with an estimated market turnover of US$ 2.5 billion. Bangladesh's commercial feed industry can be divided into three broad categories. Each category can be divided into two sub categories.

Table 19 | *Market size of total commercial feeds. Source: https://idlc.com/mbr/images/public/xWV4Ylp7Dg1TyTKLENXGmW.pdf*

Poultry Feed	Cattle Feed	Fish Feed
2.24 MMT	0.50 MMT	0.82 MMT
Broiler: 1.58 MMT	Fattening: 0.35 MMT	Floating: 0.32 MMT
Layer: 0.66 MMT	Milk: 0.15 MMT	Sinking: 0.50 MMT
63% market share	14% market share	23% market share

Recommendations

- Compound feed manufacturing should comply with the National Feed Act 2010.
- The quality of the feed must be well analysed in their own lab, label them and printed in the package before marketing (usually it is done only with limited company). At the same time, it should be cross check and compare with independent laboratory at least two times in the year.
- The price of the compound feed must be adjusted to the cost of milk production and price of the feed ingredient.

5.4 Animal health and vaccinations

The Government of Bangladesh by the Department of Livestock Services (DLS) provides the state veterinary service to the field level. This is done through its 8 divisional, 64 district and 488 sub-district (Upazila) livestock offices and a veterinary hospital network that consists of one central veterinary hospital, 64 district hospitals and 488 sub-district (Upazila) veterinary hospitals. Also, there are 9 "metro" veterinary hospitals to provide services in city areas. One to two official registered veterinarians along with other supportive sub-technical personnel are deployed in each district, sub-district (Upazila) or metro veterinary hospitals.

The registered veterinarians provide animal healthcare services as well as engaged in monitoring and surveillance activities to ensure the prudent use of antimicrobials in the veterinary sector. In addition to veterinary hospitals, DLS has several laboratories available for providing animal disease diagnostic supports to the field veterinarians and farmers. The laboratories are a central laboratory, 8 field laboratories, 1 quality control laboratory, and 1 veterinary public health and microbiology laboratory.[14]

The actual functioning of the DLS can be improved: the OIE conducted an audit of DLS in 2015 based in its OIE Performance of Veterinary Services Evaluation Tool (PVS).[15] It concluded that *"the organisational structure of the Directorate of Livestock Services (DLS) lacked units dedicated to key functions such as international trade and food safety, and did not allow the delivery of a coherent, coordinated veterinary service. In addition, there was a lack of clear 'chain of command' from central to field level. The organisational structure failed to deliver a functional veterinary service with an effective Veterinary Authority and also lacked the capacity to manage international affairs and trade and adequate capacity to deliver effective animal and veterinary public health programmes."* Although improvements may have taken place, in practice many farmers still beyond the reach of the veterinary services, most farm owners depend on informal and unqualified healthcare providers for the treatment of their animals. Therefore, irrationally prescribed and easy access to antibiotics leads to misuse, abuse, suboptimal, or overuse of these drugs in farms.

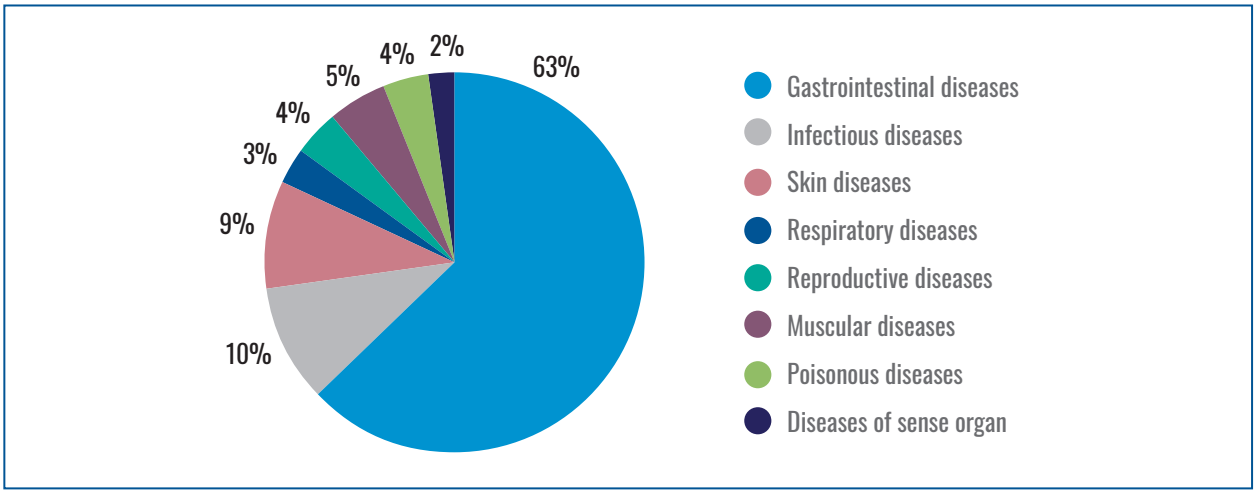
Animal health

The Veterinary Services currently implement a number of animal health programmes but these programmes are not well planned, structured or regularly reviewed. Considerable investment is being made in providing vaccine and carrying out disease control programmes but vaccination coverage is too low and the only benefit is to the individual owner (private benefit); there are also concerns over vaccine quality. There is no effective veterinary public health programme with no registration of slaughterhouses, no ante and post mortem inspections and little control of the distribution and use of veterinary medicines. Priority disease control programmes should be identified – most likely PPR, Newcastle disease, rabies and anthrax with consideration also of FMD. There should be increased emphasis on delivering health rather than combating disease – so multiple diseases should be controlled in target species e.g. haemorrhagic septicaemia and FMD.

An eradication programme for Foot-And-Mouth disease (FMD) affecting ruminants is currently underway. FMD alone, already causes an estimated annual loss of around US$125 million.[16] The World Bank and IFAD co-financed National Agricultural Technology Program Phase 2 (NATP2) works to ensure animal vaccine availability by facilitating local production at the Bangladesh Livestock Research Institute.

(14) http://old.dls.gov.bd/index.php
(15) https://www.oie.int/fileadmin/Home/eng/Support_to_OIE_Members/docs/pdf/20160606_FinalReport_PVSGapAnalysis_Bangladesh.pdf
(16) https://blogs.worldbank.org/endpovertyinsouthasia/bangladesh-steps-vaccination-protect-its-livestock

Figure 12 | *Disease prevalence. Source: Rahman et al., 2017*



The project also coordinates access by storing and supplying animal vaccines through the district and sub-district Livestock Offices, and, organizes mass animal vaccination and awareness campaigns through community agents, creating vaccine demand. Since its inception, NATP2 has conducted over 38,000 campaigns, benefiting 14.4 million animals. This coverage is expected to expand through the World Bank supported Livestock and Dairy Development Project (LDDP), which aims to improve production and market access for 2 million farming households by stimulating private sector investment and developing livestock value chains.

Animal welfare

Animal welfare is increasingly recognised by the OIE as a priority for any country but has received little attention so far in Bangladesh. It should be appropriately addressed given other priorities, and will a legal mandate to be adopted Veterinarians and veterinary para-professionals will require training in animal welfare standards and enforcement, so that animal health and animal welfare can mutually and jointly be improved.

Antimicrobial resistance

The management of animal product identification and traceability, authority over veterinary medicines and biologicals and the supervision and regulation of veterinary para-professionals is lacking. However, Bangladesh is implementing the National Action Plan (NAP) for containing AMR in human, animal, and environment sectors through “One Health” approach where the Department of Livestock Services (DLS) is the mandated body to implement NAP strategies in the animal health sector of the country. But antibiotics are still used in prevention and also as growth promoters (which is forbidden in Europe), especially in large-scale commercial farms of Bangladesh.

Using antibiotics in feed is prohibited: the “Fish Feed and Animal Feed Act, 2010” and “Animal Feed Rule, 2013” was enacted by the Bangladesh government which prohibited the use of antibiotics in animal feed and restricted the use of colistin as a critically important antibiotic. However, the main issue is lack of adequate laws: there is no law to register veterinary medicines, and prescription and use of antibiotics in livestock are neither regulated by laws nor audited.

In dairy, *E. coli* isolated from milk, milkers’ hands, and farm environment were shown to be 100% resistant against azithromycin which is recommended be only used in humans. Mastitis samples were further shown to contain multi-drug resistant *E. coli* (ampicillin: 100%, amoxicillin: 30–100%, streptomycin: 70–100%, *Bacillus, Streptococcus, Staphylococcus, Klebsiella, Enterobacter,* and *Shigella spp*. In samples from subclinical mastitis, S. aureus isolates were found with highest resistance to oxytetracycline (74.5%), oxacillin (55.9%), ciprofloxacin (49.6%), amoxicillin (42.0%), trimethoprim/sulfamethoxazole (30.0%), and to a less extent to gentamicin (17.9%), penicillin (11.0%), and erythromycin (8.2%).[17]

(17) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7811541/pdf/Vetworld-13-2713.pdf

Because farms dispose their waste routinely directly into the environment this directly pollutes the environment including ground water with multi-drug resistant bacteria which poses a high risk to human health. It also puts future treatment of mastitis at risk in cattle.

Farmers will need to be educated and trained in prudent use of antibiotics, and how to focus on prevention of disease, adopt good management practices, and good dairy farm management.[18]

Recommendations

- The collection of data on the disease prevalence must be done from all major milk and beef producing areas.
- The access to veterinary services should be ensured all time to all farmers.
- The use of the antibiotics and antimicrobial resistance should be well monitored in milk and meat.
- Good collaboration between various organizations involved is needed for effective disease prevalence monitoring.
- Apart from the Veterinary council, it might be needed to establish the National Disease Prevention Board.

5.5 Mechanisation and automation

Bangladesh lags far behind in terms of agricultural mechanisation. Agricultural machines are commonly used in land cultivation, planting of seeds/saplings, weeding, intercropping, irrigation, fertiliser application, crop cutting, threshing, cleaning, drying and other functions all related to crop production. Mechanisation for forage production is hardly existing.

In the last 2-3 decades, interest in the use of agricultural machinery at the farmer level is being observed. It is the result of the implementation of several projects through different research institutes, universities and the department of agricultural extension (DAE). DAE had implemented a project for the period 2012-2019 with funding from the Ministry of Agriculture. According to a report after the completion of the project, the use of agricultural machinery in the project area has increased production as well as reduced production costs. In addition, the post-harvest loss has been reduced by 20-90%, cropping intensity has increased by 190-204% and new employment has been created in the project area.

On the other hand, a study by the Department of Farm Power and Machinery of Bangladesh Agricultural University has said that although 90% of the machinery is used in the cultivation of agricultural land, the use of machinery in transplanting and harvesting is still far behind. Farmers are facing severe financial losses especially due to no-use of machinery for transplanting and harvesting/threshing of paddy. During the Rabi season when boro paddy is planted, there is a severe labour crisis in agriculture due to the production of other crops.

The government is very much aware of the shortage of labour during the planting and harvesting season of boro paddy. Therefore, the government has taken up the project of 'Mechanisation of Agriculture through Integrated Management' worth Tk 3,020 crore through DAE by giving utmost thrust to paddy cultivation. The project is implemented during July 2020-2025. The government is going to invest heavily to make agriculture profitable and commercial. In the five years period, 56,000 unit agricultural machines will be provided to farmers at subsidised rates through the DAE project. Farmers can buy different types of agricultural machines at a 50 to 70% subsidy. Under the project equipment will be provided for cultivation and harvesting of rice, wheat, maize combine harvesters, grain-dryers, power sprayers, potato harvesters, washing machines for carrots and other vegetables and machines for making potato chips will also be provided. This is by far the largest project in agricultural mechanisation. Skilled drivers, mechanics and repairing factories are required to properly operate and repair all these machines.

Leading organisations in mechanisation are:

- Bangladesh Agricultural University at BAU, Mymensingh
- BARI at Joydebpur, Gazipur, Dhaka
- BRRI at Dhaka
- RDA at Bogura
- American Dairy Limited at Sherpur and Gazipur

Only RDA and American Dairy Limited are engaged in milking machines and milk processing equipment.

(18) Sources: https://www.researchgate.net/publication/320858718 STATUS OF DISEASES AND DISORDERS OF RUMINANTS IN SYLHET, BANGLADESH Article in *International Journal of Development Research* – September 2017

Recommendations

- The policy can be more tailored towards mechanization where the input or technical support might be given the farmers who are willing to transform their farming practices from manual to the mechanization.
- The research also needs consider the impact of mechanization on the potential transformation of the labour market and labour productivity.

5.6 Livestock Research

The research on livestock, particularly in the dairy sector is a key element to sustain the dairy development in Bangladesh. The research domain and specific research as well as research institutes should be well linked for achieving the synchronized output. In Bangladesh, the quality of the research overall is comparable with global standards. The nature of the research and focus shift from the traditional research to the innovative and integrated research options are important to tackle the multiple complexity of the dairy and beef value chain.

The research aims not to serve an academic purpose but to focus on the needs of the farmers, processing plans and also needs of Bangladesh as a whole (sustainable development goals; SDGs-human health, biodiversity and environment preservation). In Bangladesh this transformation from academic focus to the industry focus is taking place. A number of research and public universities have started this process. The Bangladesh Agricultural University is one the biggest and most important agricultural universities in Asia and has multiple research priorities, development, livelihood improvement, food security and networking approach. The networking approach is relatively new in Bangladesh although it has been globally working to integrate people into the need for data collection, methods and model developments. This makes the data and output much stronger and useful than the traditional research.

One of the initiatives is, Integrated Dairy Research Network (IDRN) under the Department of Animal Nutrition, Bangladesh Agricultural University which was an output from the Project work with financial support from Ministry of Education (MoE) and National Agricultural Technological Project (NATP) under Bangladesh Agricultural Research Council (BARC). The IDRN is working for data generation, model development and its application at real time basis and updating the key knowledge on dairy sector monthly. At the same pace, the with recent decision of the university, the Department has also started to develop the Integrated Beef Research Network (IBRN) with financial support from the Bengalmeat. The Bengal meat is the top player in the beef market and are keen to work with Bangladesh Agricultural University to develop Beef sector model and beef price forecasting model. These two initiatives are expected to contribute to the academic research as well as industry needs.

A number of other research institutes are also emphasizing the various topics targeting the sustainable development goals of the UN (SDG), local needs, and overall livelihood of the farm family. The Bangladesh Livestock Research Institute (BLRI) is one of them and have been contributing to the national level by providing research driven technology and thus helping the government to develop the livestock sector.

Bangladesh Agricultural Research Council (BARC) is the apex research body which coordinate with all other research organization including the BLRI. The BARC has no direct linkage with public university in terms of the research collaboration but have indirect linkage only through specific project. Even with the specific project linkage, the university is most of the time can not take the lead, The project on the coordinated nature, only the research organization can take the lead. The linkage with BLRI and Agricultural University must be liberalized for accelerating the research impact.

Leading Public research institutions and universities are:

- Bangladesh Agricultural Research Council (BARC), www.barc.gov.bd
- Bangladesh Rice Research Institute (BRRI), www.brri.gov.bd
- Bangladesh Institute of Nuclear Agriculture (BINA), www.bina.gov.bd
- Bangladesh Agricultural Research Institute (BARI), www.bari.gov.bd
- Bangladesh Livestock Research Institute (BLRI), www.blri.gov.bd
- Bangladesh Agricultural University (BAU), www.bau.edu.bd
- Sher-e-Bangla Agriculture University (SAU), www.sau.edu.bd
- Sylhet Agricultural University (SAU), www.sau.edu.bd

- Hajee Mohammad Danesh Science and Technology University (HSTU), www.hstu.ac.bd
- Patuakhali Science and Technology University, www.pstu.ac.bd
- Banggobandhu Shekh Mujibar Rahman Agriculture University (BSMRU), www.bsmrau.edu.bd

Recommendations

- The research institutions and Public Agricultural University must work together to solve the specific problems and also achieving the SDGs.
- There must establish the linkage with BARC led organization, especially with BLRI to the Agricultural University where the university can take role directly with the BARC.
- The research should focus on the real time needs of the industry and university should be involved in this process to get academic benefit on this.
- The funding for the university level must be increased to do more applied research for dairy sector development.

5.7 Education and training

At present the courses on agricultural education in Bangladesh are being initiated from primary, secondary, agricultural colleges and finally from the universities. Three-year diploma courses in agriculture are being offered from the 14 Agricultural Training Institutes (ATIs) administered by the Department of Agricultural Extension (DAE) and more than 140 private ATIs across the country.

Four-year graduation degrees in agriculture, veterinary science, animal husbandry, fisheries, agricultural engineering, and food engineering and agricultural economics are being offered from the four Agricultural Universities, two Science and Technology Universities, Chittagong Veterinary and Animal Sciences University, Khulna University, Rajshahi University and Dhaka University.

The Bangladesh Agricultural University (BAU) is the oldest agricultural university in the country which was established in 1961 in Mymensingh. The course curricula of the BAU has been initially designed in 1961 for 5 year B.Sc.Ag. (Hons.) degree after SSC including two-year professional courses; the major changes were made 1970 with the introduction 4 year B.Sc.Ag. (Hons.) degree after HSC.

The course curricula of agricultural universities had been designed almost in the light of the BAU. The course curricula of the BAU and agricultural universities including Science and Technology Universities from where agricultural degrees are offered have been modified from time to time on a limited basis but time has come to have major changes in the course curricula in order to produce quality and competent agricultural graduates to meet the future challenges.

Challenges in higher agricultural education in Bangladesh
There are, in fact, many challenges in higher agricultural education in Bangladesh. However, the most significant and important challenges have been discussed in this paper. Changing the course curricula to avoid duplication/repetition After initial introduction of different courses at the undergraduate and post-graduate levels no major changes have been made at the universities.

In a recent study on the alumni of the BAU across the country it was found that most of the alumni are in the opinion that there are considerable duplication/repetition in different subjects. They very specifically mentioned the names of duplication/repetition by some recently emerging disciplines such as disaster management, biotechnology and genetic engineering, office management, communication skill (oral and written), computer skills, report writing and presentation skills, etc.

Modification of course curricula to meet the farmers' needs and aspirations
The course curricula of the Agricultural Universities and Science and Technology Universities have been prepared quite a long time ago although few changes and modifications have been taken time to time on limited scale. However, during the passage of time lot of changes have occurred in the environment, agro-climatology and natural resources. The present course cannot address all those which are the dire need of the country now, i.e. saline, drought, and flood tolerant technologies. Disaster management: disaster preparedness, mitigation and impact assessment of disasters, etc.

some of the subjects and suggested to replace the issues of duplication/repetition by some recently emerging disciplines such as disaster management, biotechnology and genetic engineering, office management, communication skill (oral and written), computer skills, report writing and presentation skills etc.

Conclusion

The quality of higher agricultural education in Bangladesh is not up to the standard of the advanced as well as other South Asian and South-east Asian developing countries. In almost each and every country has now Accreditation Council at the national level to approve the degrees offered by the universities while the universities have their own Internal Quality Assurance Cell (IQAC) in order to administer, guide, supervise and monitor the various aspects of quality of education. The future for graduates are not far when the degrees offered by the Agricultural Universities and other allied universities in Bangladesh will not recognized by the International Accreditation Councils unless Internal Quality Assurance Cell (IQAC) is established at the universities and Central Accreditation Council is formed at the national level.

5.8 Extension

Public extension institutions in the livestock sector include the following:

- Department of Agricultural Extension (DAE), www.dae.gov.bd
- Department of Livestock Services (DLS), www.dls.gov.bd
- Agricultural Information Service (AIS), www.ais.gov.bd
- Department of Agricultural Marketing (DAM), www.dam.gov.bd
- Bangladesh Agricultural Development Corporation (BADC), www.badc.gov.bd

The DAE is the largest organization and employs 14,092 field-level extension agents, 1 with each responsible for 900–2,000 farm families.

Department of Livestock Services (DLS) is responsible for offering public extension services to livestock farmers. DLS executes its services through a network of 9 regional diagnostic laboratories, 17 district diagnostic laboratories, 1 vaccines' production laboratory and more than 470 Upazila veterinary hospitals (UVH). The UVH is one-stop local center to obtain veterinary services at grassroots level. Only one veterinarian is assigned to serve a large number of poultry, dairy and other livestock farmers. These departments mainly have project-based funding. While welcome to infuse additional resources into government programs, project-based funding also has some drawbacks.

Regrettably, delivery of extension services to farmers' homes is not accessible to most rural smallholder dairy farmers. In many cases, farmers had counted their coins to access "free" extension service, at a price even higher than that of private extension services. Absenteeism in the work place and unwillingness to respond to farmers' calls are the major problems in the State extension service. Weak monitoring, poor funding, insufficient staff and lack of facilities for emergency response are other limitations of the State extension service. Smallholder dairy farmers are geographically scattered in remote villages. Many farmers are still unaware about State extension services. Many other farmers have lost in State extension services. Consequently, some farmers have to private consultants, paravets, and outright "quacks" for veterinary services. Moreover, market linkage and market information delivery are becoming essential to the dairy farmers: yet these are almost absent in the present State extension systems.

Public sector EAS actors generally act independently of each other and need a more effective system for taking farmer input or measuring farmer satisfaction or impact (Swanson, 2011). Also, many public-sector actors do not always have sufficient operational funds to effectively implement programs, with majority of funding going toward salaries and capital costs. The limited resources result in farmers in harder to reach areas, such as the riverine islands, not having the same level of access to EAS than in other parts of the country.

According to the Planning Commission, "the major weaknesses of this project dependency are that certain areas seem to attract repeated projects whereas others get none; duplication of efforts, while similar approaches may be tried repeatedly without success; and the content of the extension may depend on the parameters set by the project rather than a consideration of local need".

Public research and educational institutions have a greater knowledge of location-specific agronomy and of up-to-date farming techniques, but have limited ability to disseminate this information to farmers, in part due to the need for operational funds. The DAE is not in regular contact with the public research institutions.

Private sector EAS actors also contribute significantly to EAS in Bangladesh. They include agricultural input manufacturers (e.g., seed, fertilizers, pesticides, equipment), agro-retailers of agro inputs and crop buyers, including contract farming organizations, wholesale market dealers and local traders. Although there are many of these actors, none of them work at scale, and, thus, the number of private field-level workers amounts to around 3,500.

Other EAS actors include multilateral and development agency projects as well as international and local NGOs and civil society. Several thousand NGOs are estimated to be working in Bangladesh. They provide broad technical, organizational and financial support to farmers, but often have limited reach. For instance, the Agriculture Nutrition and Gender Linkages project (ANGeL) reaches 3,125 farmers in 16 districts and the USAID-funded SPRING project is in 40 districts. An NGO called Rangpur-Dinajpur Rural Services claims to reach 2,000,000 people in 13 districts for extension and other programs. USAID-funded extension projects often focus primarily on higher income, more progressive farmers due to their need to hit milestones on schedule, usually only reaching several thousand farmers.

The Livestock Extension Policy would refresh the knowledge and skill of policy makers and extension workers for providing demand-based extension services to livestock farmers in a non-formal participatory and decentralized manner with the objective of increased productivity and improving farmers' quality of life. Livestock extension services are multi sectoral and multi-dimensional lacking coordination among the stakeholders and the service recipients

Extension Services by Dairy Companies: Most of the private dairy companies, such as BRAC, Aftab, Pran, Ammo Milk, Akij, Shelaida, Bikrampur, Tulip, Safa, Rangpur Dairy etc work with farmers on a contract basis. They offer loan for buying dairy cows. Some new milk companies, such as Rangpur Dairy, have heifer supply and heifer-back program. These help smallholders build or expand a herd of dairy cattle. The advantage is that the company does not need to manage a big dairy farm where investments and management cost are significant.

BRAC dairy collects milk from 100 collection points throughout the country of which 10 are in ultra-poor areas. BRAC offers a fair price for quality milk through inclusion of DFT (Digital Fat Testing) technology. However, in some cases, there is a claim of misappropriation in fat determination by the DFT technician, as a source of additional income for them. Other than this, BRAC also offers dairy cattle management training and vaccination and fodder cultivation support to their beneficiary farmers.

Other companies provide technical support and expertise to the farmers to bring about qualitative and quantitative change in milk production. However, as the companies are profit-oriented, they care for production maximization: little attention is paid to increasing the price of collected raw milk paid to the farmers. The benefit to the farmer is guaranteed purchasing by nearby company outlets, which saves them time, effort and risk in finding customers, in this regard, said that the service efficiency of private companies is less than that of the State services, NGO services and cooperative extension services. However, although less efficient, this kind of extension service is self-sustaining because it creates its own revenue.

Market oriented farmers' cooperatives can share the cost of extension delivery where public extension is absent or inefficient. Bangladesh Milk Producers' Cooperative Union, which has the largest share of the country's milk market, popularly known as Milk Vita, has about 1,500 producer groups at the village level. This primary producers' cooperative offers veterinary services, artificial insemination, credit, fair price feed supply, farmers' training, guaranteed milk purchasing and a fair price to farmers for their milk.

The Union collects the service delivery charge from the per unit milk sales of each cooperative farmers. Milk Vita collects milk from farmers through its agents. Its product is processed by 12 chilling plants and 1 pasteurization plant. Although it is profitable, Milk Vita covers only a limited geographical area and a small fraction of the nation's total milk production. Usually large- and medium-sized farmers are involved with Milk Vita. The smallholder dairy farmers can build on Milk Vita's model to create their own dairy cooperative in the many places and for the many farmers not served by Milk Vita.

There are numerous farmer-based organizations in Bangladesh but, unfortunately, limited numbers of those organizations are working for value chain development and channelizing farm information. Although, some local and regional evidences show good prospect in farmer-based Organisation (FBO)-based dairy extension over public extension, the nationwide applicability and sustainability of this model is yet to be explored.

Recommendation

- Extension and Advisory Service (EAS) in Bangladesh is dynamic, with a high number of actors from different sectors, and very decentralized. The high plurality leads to difficulties in coordination between different types of EAS actors (public, private and NGO/multilateral) as well as between different areas of EAS (crops, livestock and fisheries). There is thus need for a coordinating mechanism or incentive structure to facilitate cooperation among EAS providers.

5.9 Insurances

In 2018 a report on the Agricultural Insurance situation analysis was published by the WB, FFDRR, UASAID and RVO. This study concluded the following:

- Agriculture is key in Bangladesh but highly exposed to risks.
- The Government provides significant support to agriculture, but currently provides limited support to the development of agriculture insurance.
- Agriculture insurance provision in Bangladesh is very low. Several MFIs are offering micro-insurance products linked to credit including livestock-credit insurance, but in the absence of reinsurance agreements, these programs might not be able to cope with shocks that kill large numbers of animals. Some milk cooperatives and social enterprises, have indicated strong interest in developing livestock insurance products for their milk producers. Crop insurance is not currently offered. However, for the livestock, initiative have been taking by the Department of Livestock Services (DLS) under the Livestock and Dairy Development Project (LDDP).
- On the supply side, there is a lack of knowledge and experience of the potential of agricultural services by the insurance companies and thus a lack of technical expertise in the design, rating and implementation of agricultural crop, livestock and fisheries insurance products.
- Currently, there are two weather-based crop index insurance initiatives under implementation: one is led by the government-owned insurance company Sadharan Bima Corporation, SBC, and supported by the Asian Development Bank, ADB, and the other is led by private-sector company Green Delta and supported by the World Bank Group.[19]
- An innovative flood index insurance program has been piloted by Oxfam, an international NGO, for the past two years in selected villages in Sirajganj District. This fully subsidized index insurance program made claim payments to over 700 households in 2014 following severe floods in August and September 2014.

The study recommended:

- If agriculture insurance programs were to be developed in Bangladesh, the overall legal, regulatory and supervisory insurance environment would require strengthening. The four priority areas identified for further investigation are: (1) Livestock insurance for commercial dairy farmers and poultry farmers; (2) Insurance cover for shrimp producers and artisanal fishermen; (3) Crop insurance linked to credit for small and marginal cereal farmers; and (4) Fully subsidized flood-index insurance for the most vulnerable rural households.
- International experience shows that insurance could potentially help unlock access to agriculture credit.

(19) Agriculture Insurance | GDIC (green-delta.com); www.phoenixinsurance.com.bd

Currently the Swiss Development Cooperation (SDC) implements phase II of the Bangladesh Agricultural and Disaster Insurance Programme (BADIP) aims at:

- unlocking the entrepreneurial potential of farmers through insurance and thus triggering income and employment effects,
- the emergence of an inclusive agricultural insurance market, and
- creating an enabling institutional and regulatory framework.

The Programme consists of modular components for the development of pro-poor social business models for crop, livestock or other agriculture/ disaster insurance, and for capacity building of public, civil society and private insurance sector stakeholders.

SDC explored the option for possible contributions to the social business models of the Syngenta Foundation for Sustainable Agriculture (SFSA) on crop insurance and the Palli Karma-Sahayak Foundation (PKSF) on livestock insurance. These are both tested models and currently in inception respectively on-going with a modest outreach. Both models will lead – due to the combination of insurance products with financial literacy, agricultural extension and disaster risk reduction measures – to behavioural changes with farmers investing into higher yielding crops and livestock.

The Programme will work through a Private-Public Development Partnership approach in order to achieve systemic changes towards inclusive insurance markets with sustainable benefits for the farmers. Aggregators, such as seed suppliers, buyers, contractors and micro-finance institutions will be the main policy holders and pay the premium to commercial local insurance companies.

5.10 Access to finance

The Government and Bangladesh Bank have introduced several successful initiatives aimed at facilitating rural and agriculture credit. These initiatives range from direct provision of financial services to enabling regulation, target-setting and monitoring and indirect financing.

In order to serve rural areas, the Government has created two specialized banks: Bangladesh Krishi Bank (BKB) in 1973 and Rajshahi Krishi Unnayan Bank (RAKUB) in 1987. These banks are the main providers of agriculture credit and together account for 40% of agriculture lending.

In addition, non-specialized banks are required to open branches in rural areas, to develop agriculture and rural lending and to open bank accounts to farmers with minimal requirements. Private and foreign banks are obliged to disburse at least 2 percent of their total loan portfolio as agricultural loans – including 60% to be targeted to crops/harvest sector – and often meet this requirement through on lending to microfinance institutions.

The maximum interest rate for loans disbursed under this agriculture and rural credit program is 13%, although there is a concessional rate of 4% for specific crops and activities (pulses/lentils, oil seeds, spice, salt farmers in coastal areas).

In order to cover un-served farmers by the commercial banks, Bangladesh Bank (BB) has requested state owned commercial banks to open bank accounts for farmers free of charge with minimal requirements. These accounts are being used to disburse government input subsidies to farmers and also facilitate small savings, revolving loans and remittances. BB has also introduced several customer protections measures such as the simplification of loan application forms, a 10-day maximum period for crop loan applications and the requirement to inform customers on reasons for not granting the loans.

Disbursement targets for financial institutions are set on a yearly basis by BB which has allowed 3.31 million farmers to receive agricultural and rural credit.

Bangladesh Krishi Bank – 100% government owned specialized Bank in Bangladesh[20]

- Out of total annual allocation of Loan portfolio, 60% is earmarked for Crop financing. The Credit program covers all the seasonal crops produced in the country. The loan is disbursed as per norms set by the Bangladesh Bank. The rate of interest for this sector is 9%. The rate of interest may however, vary from time to time. Both the land-owner and sharecroppers are normally the target group for this loan. Marginal farmers are also eligible for the loan. Crop loan is sanctioned on annual basis.
- BKB provides loan for Bullock, Milky Cow, Goatery, Beef fattening and other draft animals. It is basically medium term loan. The bank officials giving guarantee are responsible for recovery of loan. Each borrower will get maximum BDT 25,000/-for 5 calves (each BDT 5,000). Loan is collateral free. Repayable within one year.
- Continuous Loan: The bank is providing continuous loan for different types of activities as cash credit/working capital loan on short term basis. Continuous loan is given for processing, preservation and marketing of agricultural products.

Rajshahi Krishi Unnayan Bank[21]

- RAKUB has several loan scheme's not only for the farmers but also for SME's up to loan amount of 20 million BDT (= EUR 197,500) against 9% interest.

Recommendation

- Access to finance for all level of farmers (household, family, and business) needs to be ensured in a transparent manner.
- High interest rates are a problem. Mechanisms (subsidy?) should be developed so that farmers can cope with interest rates. When interest rates exceed expected return on investment farmers cannot afford the risk to invest.
- The Bangladesh Bank must make level playing field for the dairy and beef farmers and other stakeholders to boost the investment in this sector.
- At the same time, all of the stakeholders also need to be controlled and monitored for efficient utilization of the funds/loans available to the benefit of the dairy and beef farms.

5.11 Data generation, collection and analysis

Data is the key requirement to monitor progress the dairy & beef sector but the lack of well and real time database is the weak point in Bangladesh along with many other developing countries. Although there is a number of efforts from the Department of Livestock Services, Bangladesh Bureau of Statistics and Bangladesh Economic Review but the data are still not inconsistent. Even the data published from Agricultural Census and FAO are also not in alignment and found significant inconsistent. Reliable, precise and real time data is the key strength for making any strategic decisions at various stages of the dairy value chain.

The transformation of dairy farming from livelihood-oriented to enterprise-driven farming system might require deeper understanding on the regional differences in terms of regional potential for further dairy development by increasing milk productivity. This, however, entails detailed data on dairy farm at regional level. Since the data are relatively very scarce in one hand and on the other hand, even available, are found to be inconsistent in data accuracy and precision among various organizations, the application of the regional modelling on the data and extrapolates to the national data and vice-versa is one of the ways to identify the ways to improve the data quality and thus reducing the data inconsistency and exploring regional potential for further dairy development (Uddin et al., 2020).

Recommendations

- To improve the data quality the regional modelling approach (RMA) could play key role where the reginal data can be extrapolated to the national level. To do so appropriate initiatives by the government and its affiliated respected data collection agency (e.g. BBS, DLS) can make strong coordination among them.

(20) http://www.krishibank.org.bd/
(21) http://www.rakub.org.bd/

- Furthermore, it would be helpful to use established methods, models and validation tools before publishing the data to represent fact-based situation better for Bangladesh Dairy so that real intervention can be made to reach the target to become self-sufficient in milk production in near future. The dairy networking is highly relevant to get real time database for sustainable dairy and beef sector.
- A strong support to the innovative initiatives such IDRN and similar other initiatives around Bangladesh might need to be supported for fostering their research work.

5.12 Taxation and regulatory framework

All current laws and regulations applicable withing Bangladesh are listed at the website Laws of Bangladesh.[22]

All foods sold in Bangladesh must comply with a range of laws designed to protect consumer, plant, and animal health. These laws apply equally to imported and locally produced foods. All imported plants, plant products, and food must comply with quarantine, imported food standard requirements, and food safety requirements. To fight against threats to food safety and protect public health, the Food Safety Act, 2013 came into effect on February 1, 2015.

The Food Safety Act establishes basic definitions, goals, and principles for food safety. It also defines procedural rules and coordination mechanisms between different public administrations responsible for food regulation. It sets out general food safety and health protection rules, regulates inspections, detention, and seizure rules of suspect food and classifies breaches. The Food Safety Act, 2013 gives BFSA regulatory control over food safety and food quality. The statute is designed to provide protections over food from farm to fork. To protect human health through the new food law, pertinent regulations are being revised, updated, and drafted. BFSA monitors food products to safeguard public health and welfare. It also oversees the entire production chain, from raw materials to processed products to consumption. BFSA is an independent agency in the Ministry of Food.

There are several major laws and orders in Bangladesh pertaining to safety and standards of imported food:

- Food Safety Act, 2013
- Food Safety (Contaminants, Toxins and Harmful Residues) Regulations, 2017
- Packaged Food Labelling Regulations, 2017
- Bangladesh Standard and Testing Institution Amendment Act, 2003
- Import Policy Order, 2015-18
- Plant Quarantine Rules, 2018
- Bangladesh Animal and Animal Product Quarantine Act, 2005

Enforcement of food safety laws and regulations in the country are very weak due to several drawbacks in the legal and regulatory system. A high number of acts, laws, and regulations of various categories of food products create overlapping and complexity in application and enforcement.

Overlapping of regulatory bodies and lack of coordination among ministries covering various categories of food and agricultural products creates a haphazard and confusing maze, diminishing the goal of food safety. Fifteen ministries are involved in food safety and quality control, while ten ministries are directly involved in food inspection and enforcement. Despite having various shortfalls in the food safety framework, the act and regulations that cover imported products, especially bulk imports, are strictly enforced and sometimes excessively.

Recommendation

- The import and export tax and tariff must focus on the real time development of the industry.
- With specific to agricultural products (more specific to dairy and beef), the tariff should be based on the research findings and business consultation but not only the emotions and reactions from some part of the chain of the dairy and beef.

(22) minlaw.gov.bd; http://bdlaws.minlaw.gov.bd/

6 Business opportunities

6.1 Successful examples of innovations

The ongoing structural transformation of dairy and beef sector in Bangladesh has opened the business opportunities at national and international level. The increasing number of corporate dairy farms and also feedlot beef farm would entail high mechanization, improved management, increasing in the feed efficiency through balancing the dairy ration, provision of the water and generation of the real time data as well as maintaining Key Performance Indicators (KPI) for the farm. There are some successful examples of innovation in the country especially in the feed, management and veterinary services. Some examples of the successful innovations and its related business opportunities are stated below:

Rice straw baling technology: The introduction of the Rice Straw Baling Technology (Uddin, 2021) is one of the key innovations in the history of Bangladesh dairy and beef sector. Rice straw as such is poor in nutrients (even not considered as feed in the developed dairy countries globally) but this is the most common roughage source in Bangladesh. About 100% of the farmers use rice straw varying from 3–6 kg per day per cow/beef cattle at least for 3 months in the year and 60–70% of the farmers use rice straw as basal diet throughout the year. The price of the rice straw has increased by 53% during last four years (2018–2021). The straw harvesting, transportation, storage and feeding is highly complex and due to its bulkiness, it has impacted tremendous negative impact to the overall feeding management of the rice straw. The research team under the Integrated Dairy Research Network (IDRN) in the Department of Animal Nutrition, Bangladesh Agricultural University with the financial support of the Krishi Gobeshona Foundation (KFG) has invented the new and innovative technology for reducing storage space, transportation and labour cost and ease of management. This technology can be extended to the broader scale for increasing in dairy and beef productivity in Bangladesh.

Silage technology: At the same pace, the silage production is getting very popular for which the business opportunities for grass production, grass harvesting machineries, automatic silage preparation, wrapping and silage quality improvement technology are highly preferable.

The introduction of the Medicinal plant (e.g. plantain) as powder form (Al-Mamun, 2021) may offer good replacement of the antibiotics, which is relevant in view of the increasing antimicrobial resistance (AMR) which opens the business opportunity for drying machines (Freeze drier) and other equipment.

The degree of mechanization is increasing: This imposes the introduction of the milking machine, packaging machines, cooling tanks and other equipment are highly preferable. The comprehensive Dutch solutions on those would enhance the business strategies between Bangladesh and the Netherlands.

6.2 Identified business opportunities

From the research and from the country visit in 2022 and further information exchange with Dutch and Bangladesh dairy entrepreneurs, there were several business opportunities for improved dairy production are identified.

6.2.1 Production sector milk chain

6.2.1.1 Small holders (1–3 cows in milk)

Dairy farmers are considered small holders when having between one and three cows who provide milk, they are referred to as Household Farms (HF; see Chapter 2.2). The milk production is one of the income sources, mainly consumed at household level, and surplus milk is sold. Household Farms form a major part of dairy production in Bangladesh.

6.2.1.1.1 Improved fodder production

As previously reported in the study, most farmers are dependent on rice straw as the main source of fodder. Although very common, this is a far from optimal ration for dairy cattle and milk production is low. Although concentrates and roughage are available, the quality is not very reliable, and the price is high. Providing better greenfodder would enhance milk production.

6.2.1.1.2 Breeding, genetics and artificial insemination

Small holder farmers hold both local and crossbred animals where few animals produce milk. Artificial insemination, specifically high-quality semen is a service which needs to be improved, although it has only value when the animals will also receive adequate rations and better green fodder. High quality semen is highly in demand: semen, especially with the adaptive capacity to the tropical country is highly preferable. Training and capacity building on improving heat detection and artificial insemination skills is also highly needed.

6.2.1.1.3 Transparent Milk Payment Systems – digital tools

The payment of milk is often cumbersome and not transparent for smallholders. Quality based milk payment schemes (QBMPS), that would incentivize production of high quality milk, are not existing for smallholders. Instead, payment is often not transparent. Therefore, modernized payment systems, and also quality based milk payment schemes would make milk production more attractive. Digitalized payments from Milk Collection Centers (MCC) could enhance this. Noteworthy is development of female-operated digital MCCs such as Parilli, who use money transfer through a digital account. This provides appropriate and safe management of their household. This group of suppliers delivers between one and ten liters of milk per farm daily at the MCCs. The cash flow generated by milk sales to the MCC is a substantial contribution to the livelihood of the families and greater independence of the women.[23]

6.2.1.1.4 Technical assistance, education and capacity building

Overall the technical understanding of keeping cattle healthy and knowledge on high quality milk production is low. Technical assistance programmes are much welcomed. Specifically, training and extension services have improved the skills and knowledge in dairy production. Initiatives such as the BRAC Dairy & Food project[24] have improved access to vaccinations and veterinarians which were welcomed by farmers and have been helpful to improve dairy business. The introduction of the Mobile Veterinary Clinic (A special car with all equipment and Veterinary Surgeon) by Livestock and Dairy Development Project (LDDP) under DLS in 300 subdistricts is a new version of the veterinary services to the marginal farmers. Education and improving good farming practices by extension services, field training, digital tools together with access to affordable equipment and goods required for good quality milk production are highly needed.

(23) https://www.solidaridadnetwork.org/news/how-women-dairy-farmers-are-taking-charge-with-digital-solutions/
(24) http://www.brac.net/brac-enterprises/item/882-brac-dairy-food-project

6.2.1.1.5 Constraints

It is important also to acknowledge main constraints to improve sustainable milk production.

- Providing greenfodder would enhance milk production, but proves more difficult to provide since food production for human consumption has priority. Therefore, there are competing claims on the land.
- Beef is the main competitor of dairy production, due to the high prices of beef and the fact that the border with India is closed for beef which has impact on availability of the beef. This also has positive business opportunities within the country as consumers have more preference to the local beef cattle than imported beef cattle from India.
- The sustainability of the dairy and beef sector assessment using composite index has not yet explored and also the cost of milk production at farmers level by processors has not yet been in action to set the milk price.

6.2.1.2 Medium sized farms (4–16 cows in milk)

6.2.1.2.1 Improved fodder production

Medium sized farms are the Family Farms (FF). They operate with the goal to generate income mainly from production of milk for sustaining the family. Almost all visited farmers manage to have some greenfodder as part of the roughage, however on dry matter (DM) intake it serves only estimated 5–25 % of the required amount. For urban farmers, e.g., for Dhaka, the greenfodder cultivation is limited and many of them use naturally grown grasses in the fellow land nearby their farm and to some extent, they also use water-hyacinth during scarcity period. Due to the high feed prices farmers are seeking alternatives. At some city farms bagged grass silage is bought from other regions. However, based on DM the price is even higher compared to concentrates. Although concentrates and roughage are available, these farmers have a need similar to smallholders: better access to affordable greenfodder would enhance milk production. As example the Polash Model Dairy Farm has a fully operational feed mill plant located in Monirampur in Jasore district. This medium sized farm holds both dairy and beef cattle, and also produces feed for sale. Another example is the Volanath Model Dairy Farm, where the main source of fodder is Napier. There is almost 2.5 acre of land available for the growth of green fodder. The farmers maintain a zero grazing system, and grow hybrid grasses for cut and carry. The fields are approximately 1 to 2 kilometers away, a motorized van is used for the transport of the fodders. This farmer is a supplier of BRAC for the formal milk market chain. Thus, when land is available for fodder production, support can be provided to initiate more local forage production.

6.2.1.2.2 Breeding, genetics and artificial insemination

Similar to smallholders, family famers often hold both local and crossbred animals, even with higher proportion of cross breeds are kept in the family farm. Better quality stock breeding can improve milk production (provided feed rations are adjusted at the same time) and using better genetic materials by artificial insemination services can facilitate this. Setting up of bull stations and better access to semen and AI are opportunities to be further explored and developed.

6.2.1.2.3 Efficiency in milk production

A key element in profitable dairy farming is production against a low cost price, hence efficient milk production. The production per cow for medium-sized farms varies from 5 to 15 kg per day. However, the percentage of dairy animals in lactating compared to the total dairy herd size varies from 28% to almost 42%. Thus, only a small proportion of cows is actually producing milk and gaining income for the farmer. Also, milk price can vary considerably, making the market highly volatile: as for example, the milk price in the formal market is about 40 BDT, while city farmers can sell their milk up to 90 BDT/kg in the informal market. Better understanding of cost, price and key performance indicators (KPIs) in efficient dairy production can help in making farming more profitable. Such tools can be provided by teaching and education supported by simple recording tools, even simple digital tools.

6.2.1.2.4 Machine milking

Medium-sized farms who are progressive and like to grow have great demand for machine milking. Farmers are interested in advancing their milking practice, as most farmers are still practicing hand milking. For medium-sized farmers this will be mostly simple portable milking machines for 1–3 cows at the same time. With regards to the equipment, there is a need for making available for maintenance and repair, and technical services should be available to ensure proper functioning and aftersales. A business opportunity is, therefore the supply of milking machines, associated with set up of technical support, and maintenance and repair services. This would also include training of technicians and engineers on various machines, farm operation and good management practices.

6.2.1.2.5 Technical assistance, education and capacity building

Medium sized farms have the potential to increase herd size, reach better economy of scale, and obtain a higher efficiency and profitability in milk production. This requires a thorough understanding of good dairy farming practices. This is lacking to some extent in current farm management practices. Also urban farmers are often small investors with no background in animal husbandry practices, but they are motivated to start business due to the high demand for liquid fresh milk. Therefore, there is a large demand for training and capacity building. A useful approach that has proven value in many other dairy markets is making use of model demonstration farms, where farmers can be trained in a practical manner. Such model farms should be diary producers themselves, yet with extra facilities to function as training centers. Examples are the Polash Model Dairy Farm and Volanath Model Dairy Farm (both supported by Solidaridad Asia Network), that both practice good dairy farming. Farmers in the region are trained in adopting good dairy farm practices taught on the model farms. Fourteen training modules are currently available. Training is given in local language supported by simple practice sheets with illustrations and pictures. Therefore, an opportunity is to set up more model farms, by equipping suitable farms with modern dairy equipment and goods, and extra facilities to function and develop training centers. Both the farm personnel itself should be trained and be able to function as good example for dairy farms in the region. New equipment or technologies could be introduced to this type of farm, and incorporated in practical training sessions.

Due to low rice prices, in for instance Jashore district, growing (green)fodder for animal production seem to be economically interesting. This opens the opportunity for regional value addition and marketing. Therefore farmers need to organize to regulate supply, and investments in processing equipment and a marketing strategy must be set up. In this way transport lines stay short, and the local economy is stimulated. The Netherlands can support such initiative with knowledge and equipment, in return Bangladesh might be an interesting trade partner for freshwater fish products.

An opportunity might also be to support the Bangladesh Dairy Farmers Association (BDFA). The BDFA has 28,000 members and covers the whole country. The association is free of membership contribution due to the commercial activities. Its services are mainly: Training; Financial support; Technical support; Artificial insemination support; Medicine support; and Feeds. However, the BDFA is still in the growing phase and not yet able to address the real need and has not been able yet to function as main representative body for dairy farmers due to the different leadership within the Dairy Farmers Association. The well functioning of the Dairy Famers Association is highly in demand.

6.2.1.2.6 Constraints

For medium-sized farms, the main constraints include:

- Lack of artificial insemination services, including availability of semen of high quality
- Lack of high quality feed
- Lack of feed supply
- At many farms where dairy cattle are kept beef animals can also be found. But due to the yearly religious festival(s) there is a huge demand for beef animals for slaughter on particular days (> 8 million animals). Since the borders with India are closed Bangladesh produces beef for domestic use resulting in very good meat prices during festival. This situation makes a competitive dairy development difficult.

6.2.1.3 Large scale farms (Business Farms; BF)

6.2.1.3.1 Improved fodder production

Farms with more than 16 cattle, but often many more are considered Business Farms (BF), with the goal to operate as business enterprises with a high return on investments. However, the number of farms with more than 100 cattle is low: about 100, and with more than 250 cattle even less than 10 (see Chapter 3). The majority of Business Farms has 25–50 cattle. These farm have an industrial approach to dairy production. Often fodder production is a problem when the farms do not have enough land: fodder is then purchased, sometimes from regions up to 100 km distance. Animals are fed a total mixed ration (TMR) with silage (maize), greenfodder and concentrates. Premixes and calf milk replacer is already obtained from the Netherlands. When land is available for fodder production, this can be profitable (regional) businesses to supply dairy farmers in a region with better fodder than rice straw. Fodder transport and conservation techniques need improvement.

6.2.1.3.2 Breeding, genetics and artificial insemination

Large scale farms need to operate with high milk production and this requires high genetic material to produce high quality stock. Business Farms have often sufficient capital to purchase heifers from abroad, but a more sustainable solution is to set up bull stations for high-quality semen and improve artificial insemination services. When successful, this may even allow to supply South and Southeast Asia with breeding material.

6.2.1.3.3 Efficiency in milk production

Farm management and use of proper dairy farm management tools such as specialized software, planning of feed supply, maintenance of farm hardware, management of cost price and monitoring of key performance indicators (KPIs) is needed for profitable farming.

6.2.1.3.4 Machine milking and equipment

Larger business farms use milking parlour, such as with 2×6 herringbone, or even bigger. Proper maintenance and repair is crucial for well-functioning of milking machines, and technical services should be available to ensure proper functioning and aftersales. Here lies the Business opportunities where it is need to supply of milking machines, associated with set up of technical support, and maintenance and repair services. This would also include training of technicians, farm managers and engineers.

Modern investments such as biogas installations or solar panels are only relevant for the major dairy enterprises. Dutch dairy is an example of such a big enterprise, with biogas installation, and even a slaughter house under construction for the beef section. In addition, to address the government ambition to reduce the greenhouse gas emission by 22% in 2030, this also opens business opportunities for the Dutch Company to teach and train the dairy farmers in Bangladesh on how to manage the manure in modern way that would reduce the methane emission.

6.2.1.3.5 Technical assistance, education and capacity building

For major dairy enterprises, economy of scale and high efficiency and profitability in milk production is crucial. However, often these farms have sufficient budget to employ management staff from abroad or send staff abroad for dairy production training, and these highly educated staff do train in-house the local staff. Therefore, the business opportunity for technical assistance, education and capacity building for the very large scale farms is not so big.

6.2.2 Processing and milk market

Only bigger farms have their own processing facilities, to produce milk, local popular Laban (sweetened, cultured milk) to UHT milk, cheese and yoghurts. Apart from bigger farms there are a few large dairy processing companies (see Chapter 3.2). Less than 5% of the total milk produced is processed and is distributed through to the formal market, thus this is a relatively small part of the total milk marked in the country. Processing companies even with their own capacity to manufacture of powder milk but still they sometimes are compelled to purchase powder milk from abroad, and this competes with locally produced milk, in terms of price. A business opportunity is improving milk quality from the family farms, and via better quality control at MCCs, offer dairy processors an alternative source of milk for their products. The milk quality is often poor and not comply with BSTI regulations. At the MCC's currently only basic test equipment is available to make payment based on fat content possible. The supply chain is quite long costly, and time consuming, chilling centers assure a suitable cooling chain to maintain the quality at an acceptable level. The milk supply depends mainly on smallholders, medium size farms often try to find their own way of making added value in the milk chain. Overall, there is a big demand for fresh milk, but it is difficult to purchase, suppliers are not organized, collection is expensive (MCCs/cool chain/transport) and milk powder is easier to get. This is a constraint in the development of the dairy production sector. At governmental level, data collection, data analyses, leading to specific support programs for the development of the dairy sector are needed.

6.3 Summary of business opportunities

6.3.1 Outcome of workshops and meetings

- Great demand of high-quality genetics
  - Wish to have bull station in the country (south Asia)
- Imports of feeds for better price (present: feed is 75% of the cost price for fresh milk)
  - Strong land competition for fodder production
  - Regional opportunities (depending on soil/climate/farmers, etc.) to improve green fodder production
- Capacity building on dairy farming skills and AI skills
- Milk supply
  - Collection system together with transparent payment
  - Cooling chain

6.3.2 Constraints for the sector to develop

- Land availability for (green) fodder
  - Animal husbandry is based on crop residues (not suitable for dairy)
- For small- and medium-sized farms: competition with beef sector
- High feed prices which has recently further increased due to Ukraine Russia War and currency devaluation that cause higher import price for the major three ingredients which are ultimately used for the livestock feed
- Traditional knowledge and approach of production
  - Smallholders 1–3 cows in milk
  - Only a handful of farms have more than 100 dairy cows
  - Strong position of the informal market
- Imports of milk powder
  - Usually cheaper and of better/constant quality. This means that improving milk quality is a key requirement to compete with milk powder import. This is best achieved business farms and family farms
- No clear political strategy

6.3.3 Opportunities for the sector to develop

- Urban farming, production/processing near the market
  - Chance to formalize the market and increase food safety
- Improved breeding (crosses) dual purpose
  - Fodder quality not suitable for pure dairy at smallholder level
  - Beef is at many farms more important in (yearly) cashflow
  - Milk has a strong position in daily cashflow
- Milk production specialization on a limited number of large farms
  - Interested investors?
  - Chance to increase knowledge
  - Long-term multiplier effect (at medium size level)

6.4 Recommendations for business opportunities for Dutch businesses

Based on this study, the opportunities for Dutch dairy entrepreneurs can be found on various levels, with various business partners (see Table 20). On the short term, the Corporate Farms (the most advanced representatives of the Business Farms) have the financial resources to pay for Dutch products and finance investments such as for housing, new stables, animals, AI and high quality semen, machinery and equipment milking and fodder cultivation. The bigger family farms also have resources to pay for high quality products. However, smaller Household Farms have limited financial resources and need to be reached via (international) donors or government programmes procuring or implementing dairy development programmes, such as the WorldBank, Solidaridad or other, including RVO. Training and education can be paid for by Business Farms themselves, also for hiring dairy experts. For Family Farms and Household Farms training and education must be arranged via (international) donors or government programmes implementing dairy development programmes.

Table 20 | *Recommendations for Dutch businesses*

	Fodder	Breeding, genetics and artificial insemination	Milk quality and payment	Efficiency in milk production	Education and training	Business partner
Business Farms	• Concentrates • TA* on better roughage (high quality!) • TA on greenfodder*	• High quality semen • AI centres • Animals	• Technical support and maintenance of machinery and equipment • Quality Based Milk Payment Schemes	• Housing, machinery, equipment and supplies • Farm management tools • Milk processing equipment • Biogas installations • Solar panels	• Good dairy farming practices (efficiency, milk quality, AI, animal care, machinery, automation, KPIs, climate smart,...)	Business Farms
Family Farms	• Concentrate • TA on roughage (high quality!)* • TA on greenfodder supply*	• High quality semen • AI centers	• Technical support and maintenance of milking machinery and equipment • Regional collaboration in milk collection and processing • Quality Based Milk Payment Schemes	• Machinery, equipment, and supplies • Farm management tools • (Solar panels?)	• Good dairy farming practices (efficiency, milk quality, AI, animal care, machinery, KPIs, climate smart,...) • Set up of model demonstration farms • Set up Milk Collection Systems	Family Farms themselves (small investments/ Donors/ development programmes (big investments) (Milk Collection Centres; Farmers associations?)
Household Farms	• TA on greenfodder supply*	• High quality semen	• Transparent Milk Payment Systems; digital tools • Regular supply of milk with reasonable price	• Supplies (some equipment)	• Good dairy farming practices (AI, animal care, etc.)	Donors/ development programmes

TA: Technical assistance/consultancy

7 Doing business – regulatory environment Bangladesh

Foreign investments
Foreign companies operating in Bangladesh enjoy preferential trade benefits and friendly investment policies, many of which are due to the country's status as a Least developed country (LDC). Due to inexpensive labour and overhead costs, manufacturers of low-cost products have been a large revenue earner.

Foreign companies are permitted to establish wholly owned subsidiaries in Bangladesh under the 'Companies Act 1994', for establishing either a private limited or a public limited company. Like wholly owned subsidiaries, foreign companies can incorporate a joint venture company with Bangladeshi partner(s). The equity ownership of the foreign company will vary depending on the amount invested by each party. Foreign investors are free to invest in local companies (subject to limitation in certain sectors) There are no restrictions on the transfer of shares to non-residents. Foreign investors may sell their shares, irrespective of their percentage of shareholding.

Foreign entities can conveniently get access to funding from local financial institutions for short and long-term investments, including loans for working capital, syndication and trade financing. Alongside this, some of the local and international Foreign Institutions (FIs) have access to on-shore and off-shore funding facilities. A tax treaty to avoid double taxation is signed between the Dutch and Bangladeshi government (July 1995).

Bangladesh has undersigned the MIGA agreement.

Government incentives for encouraging investments
The Bangladesh government has welcoming investment policies, geared towards encouraging entry of investors in the secondary and tertiary sectors. As part of the government's liberal policy regime, several benefits have been instituted for investing in certain sectors. Examples of such benefits include tax exemptions, import duty waiver, ease of profit, capital repatriation and preferential benefits.

Additional, more detailed and actual information on doing business in Bangladesh is provided on the following websites, i.e.:

- Bedrijf starten in Bangladesh | RVO.nl | Rijksdienst
- Landeninformatie Bangladesh | Ondernemersplein – KVK
- BGD.pdf (doingbusiness.org)
- KPMG Bangladesh – Doing Business in Bangladesh (doingbusinessguide.co.uk)
- Welcome to BIDA

8 Key stakeholders' dairy and beef sectors

8.1 Top private sector players

- **Milk Processing companies:** Bangladesh Milk Producers Cooperatives Union Ltd (Milkvita) BRAC Dairy and Food Project (Aarong), PRAN Dairy, Akij Dairy Ltd (Farm Fresh) (see also Annex 2)
- **Meat and Meat Processor: Bengal Meat Processing Industries Ltd**, Northern Foods Limited, Imperic International Ltd
- **Feed Company:** Nourish, ACI Godrej, Paragon, United Feed, Kazi Farms, Quality Feed Ltd
- **Medicine Company:** ACI Ltd, Advance Pharmaceuticals, Renata Bangladesh Ltd, Popular Pharmaceuticals Ltd, Pharmvet Farm Care, Novartis Bangladesh Ltd, Animal Health Companies Association in Bangladesh. The Acme Laboratories Ltd, Insepta Pharmaceuticals Ltd, SK+F Agro vet division, Square Agrovet Division, FnF Pharmaceuticals, Doctors Agrovet
- **Artificial Insemination Program:** BRAC AI Enterprises, American Dairy Limited, ACI Lts, Lal Teer Ltd

8.2 Public stakeholders

Department of Livestock Services, BLRI, LRI, Bangladesh Milk Producer Co-Operative Union Ltd (Milk Vita).

8.3 Dutch private sector engagement in both value chains

The engagement of Dutch companies in the dairy and beef market Bangladesh is limited. According to local sources 9 companies are doing business or have interest in doing business in Pakistan (Table 21).

Table 21 | *Dutch companies active or shown interest in Bangladesh dairy market*

No	Company	Activity	Internet
1	Trouw Nutrition	Feed	https://www.trouwnutrition.com/
2	DSM	Feed	https://www.dsm.com/corporate/about/businesses/dsm-animal-nutrition-health.html
3	De Heus	Feed	https://www.de-heus.nl/
4	KI Samen	Semen	http://www.ki-samen.nl/en
5	RBK Group	Construction	https://www.rbk.nl/en/
6	MS Schippers	Farming products and equipment	https://www.schippers.nl/
7	AI Total	Semen	https://www.ai-total.com/
8	Denkavit	Feed	https://denkavit.com/en/
9	FRETEC BV	Consulting processing and technology	https://fretec3.frenet.nl/

We have conducted a small survey among the companies to identify business opportunities. By emails and follow-up telephone calls, the following questions were asked: how long have you been active in Bangladesh; what is the biggest opportunity for your business area; what is the biggest challenge; and what is needed for doing more/better business. Unfortunately, only about half of the companies were willing to share information on the questions (see Annex 5).

Overall companies were only active a few years in Bangladesh, varying for exploring the market, to actual sale results. Feed and semen are clear products for which there is a need, but the market is unregulated, with substantial government influence and possible trade restrictions. The biggest opportunity is the huge dairy sector, and big need for modernisation. Products from Dutch companies would be ideal to suit the needs, however there is competition from other countries, and Dutch products have the image of being of high quality, but expensive. The biggest challenge is the lack of knowledge among farmers in the dairy sector and hence the ability to value high quality. Proper education and training on all levels (farmers, extension officers, veterinarians) on modern sustainable dairy farming is needed and would help to value high quality Dutch products. What is needed for better business is therefore developing the market with govern help, RVO is mentioned as one of the actors that could support this.

9 Key constrains and bottleneck's dairy and beef sector development

Technical

- Genetic limitation (poor quality breed) for higher milk production
- Access to quality feed
- Lack of technical knowledge of the farmers

However, there are various issues hindering faster growth of dairy farming. Apart from shortage of high yielding cows, scarcity of land for dairy farms, shortage of high yielding and quality semen for AI, lack of technical knowhow for farming, high cost of labour and feed, inadequate treatment facility for cattle and lack of knowledge of handling milk are the major hindrances for faster development of the sector, said farmers and industry stakeholders.

Institutional

- Lack of institutional capacities for knowledge transfer, research, extension and marketing services
- Lack of institutional complementarity between public and private sector actors affecting access to inputs and services
- Lack of policy implementation and authorities Institution

Even though per capita milk consumption is low in Bangladesh, domestic production is still insufficient to meet existing demand. In the formal market, 55% milk is imported. The sector's growth rate remains far behind that of the neighbouring countries (2.05% against 4.1% in India and 4.9% in Pakistan). The reasons for such modest growth rate are lack of good policy, insufficient data on the sector to formulate good policy, lack of political commitment and less attention and insufficient budget allocation (only 0.3% of national budget) leading to poor attraction of private investments to the sector.

Socio- economic and Infrastructural Challenges

- Poor milk collection, transportation and processing system
- Low product diversification opportunities
- Limited options for credit, subsidy, insurance
- Lack of breeding operational strategy and records
- Less awareness among consumers on nutritional values of milk

Climate Change

- Climatic impact due to lack of climate adaptation/mitigation strategy
- Lack of adoption of waste management technology

> Emran said farms are slapped with electricity bills at commercial rates although dairy belongs to the agro-based sector. *"This increases cost of our operation. We demand waiver from electricity bills at commercial rates as dairy belongs to the agro-based sector,"* he said. *"We also need support to import modern equipment for dairy farming."*
>
> Both Muniruzzaman and Newaz recommended establishing a Dairy Development Board soon to promote the sector. *"Formulate and implement a national dairy policy and National Dairy Development Board to create a platform for dairy development in the country,"* said Newaz of BRAC Dairy.
>
> Muniruzzaman suggested providing easy and low-cost credit facility for the farmers and subsidy in feed and medicine, increasing facilities for animal husbandry and treatment, and taking steps to improve breed of high yielding cows. *"Allow good entrepreneurs to import semen for breed development,"* he said, also recommending duty restructuring to import machineries, chemicals and packaging materials for the dairy sector.

10 Sector development opportunities

Industry insiders have said that this huge supply-demand gap offers business prospects as there is scope to increase milk yield per cow in the country as there is a high density of cattle population. The World Bank, recently in a document, said growing demands for animal source food, a high density of cattle population, very high potential for productivity improvement, agro-ecological conditions favourable to feed production, availability of crop residues, and a culture of mixed crop-livestock farming represent assets the sector can build on.

> Muniruzzman said Bangladeshi cows are low in yield providing 2–5 litres of milk per day. *"If new breeds of cows are developed, they can provide even 14–15 litres of milk per day. This is not an overnight process but a gradual one that will develop generation by generation. Within 10–20 years, this can be done,"* he said adding that Pran works with 12,000 farmers in five dairy hubs in four districts – Rangpur, Natore, Pabna and Sirajganj – to improve productivity.

Sector development opportunities therefore exist at various levels:

- Improving dairy practice by education and training of farmers. For Household farmers this should be supported by international donors and a government policy. Family farmers could be educated to for cooperatives, and jointly exploit milk collection centres, and milk processing centres. This can create the foundation for targeted education and training programmes. Business farms will have the budget to invest in targeted staff trainings, and invited (foreign) experts to visit their farms and set up an in-company milk quality improvement programme.

- Improving access to high quality semen and AI by setting up AI centres. This can be initiated by international donors supported by a government programme for Household Farmers, Family farmers and Business Farms.

- Improving milk quality by introducing a quality-based milk payment schemed (QBMPS). This can be initiated by international donors supported by a government programme on milk collection, transportation and processing systems for Family farmers.

- Increasing dairy production by improving access to green fodder and high quality roughage in regions where there is a shortage. This needs government support in assigning certain geographical areas dairy production. In such areas increased production of high quality fodder is possible. In areas where access to land is restricted, the production is limited to the area of available land, because import of high quality feed will decrease the profitability of the milk.

Based on the findings of this study, a SWOT table is presented below, presenting the main strengths, weaknesses, opportunities and threats of the dairy sector.

Table 22 | *SWOT table of dairy sector*

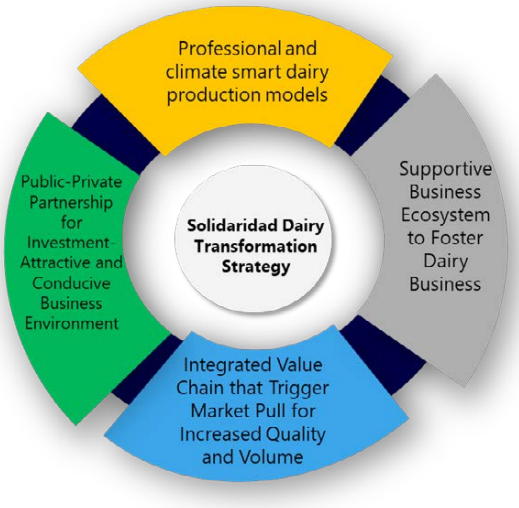
	Strengths	Weaknesses
INTERNAL	— High demand for milk — Increasing milk production — Increasing animal numbers — High price for milk — Many dairy development programmes — Government support	— Low production — Relatively few commercial farms — Low share of registered milk — Low organisation of small holders — Milk quality — Low level of knowledge on modern dairy farming — Feed price is high and highly volatile
	Opportunities	**Threats**
EXTERNAL	— No self-sufficiency for dairy — Nutritional demands for children (schoolmilk) — High demand for sweetmeats — Export markets for dairy	— Import of milk powder — Adulterations of raw milk — Food safety risks (AMR, aflatoxin/ cancer) — No incentive for quality milk supply — Competing claims for land — Climate change (water scarcity, resource-intensive product)

ANNEXES

ANNEX 1 – Solidaridad SaFal-II project

Supported by the Embassy of the Kingdom of Netherlands, Solidaridad has been implementing the "Sustainable Agriculture, Food Security and Linkages phase II (SaFaL-II)" project since July 2017 in coastal region of Bangladesh. SaFaL-II is the logical consequence of succesful implementation of phase 1 (implemented in between 2012–2017) has been working to promote adoption of sustainable agricultural practices and market linkages for production and consumption of healthy food for the rural and urban consumers. By stimulating ecosystem based agricultural production and market uptake of safe and healthy food, Solidaridad is enhancing the livelihood wellbeing of the smallholder farmers. SaFaL-II interventions are directly contributing to the promotion of market linkages and trade facilitation for transforming market through business intelligence, decision support system and innovative business plan facilitation. With an inclusive approach, the project reached over 106,000 households that are active in a given subsector (either aquaculture, dairy, soybean or horticulture) to participate in a producer group, regardless of their farm size or other characteristics. The project developed 80 farming clusters and 51 market structures and 1,531 producer groups, which are contributing to increased farm productivity and market access towards enhancing food security, economic development and human well-being of 0.5 million people. These platforms have been playing a catalyst role for building B2B linkages among producers and market actors in supply of agro-inputs (seed and other inputs for production) and sourcing of farm produces. This activity is geared towards meeting the demand of safe and sustainable food for the consumers at local and export market. These platforms could be best optimized for transforming the food market system in order to make the food sourcing and supply more robust and efficient.

The project has been working for dairy sector development in Bangladesh to improve productivity, market participation and resilience of smallholder farmers and agro-entrepreneurs in dairy value chain that will foster win-win private-public integration to establish smart and profitable dairy ventures.



Specifically, Solidaridad strives to achieve the following results:

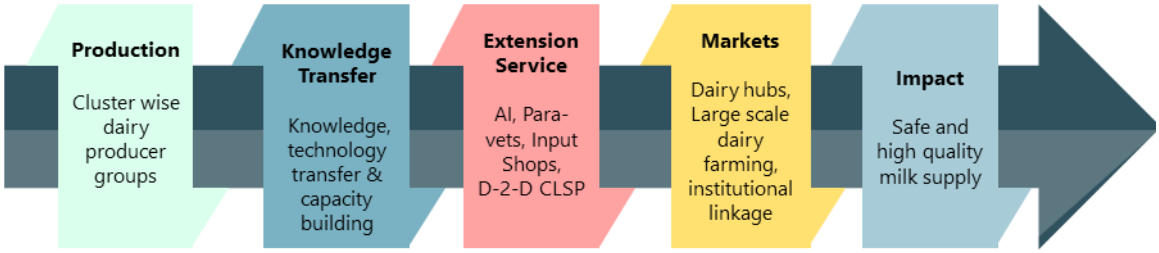
1. Enhanced dairy productivity and income of the smallholder farmers through adoption of cluster-based smart dairy model;
2. Attract future investments to foster dairy market growth through demonstrating commercial business cases of successful public-private partnerships.

Solidaridad is investing in smallholder dairy farming to increase the production and consumption milk and milk value added products to meet the nutritional demand of the growing Bangladesh population. Solidaridad is currently supporting over 24,000 smallholders in southwest Bangladesh to improve their farm productivity and supply quality milk through the adoption and adaptation of sustainable practices. Farmers are collectivized and organized in 383 producer groups and supported by 150 Lead Farmers – each of the producers' groups developed their business plan to increase milk productivity from dairy farming.

To improve the competitiveness with sustainability and to tap the market opportunities, Solidaridad dairy business model is investing in four key areas:

1. Adopting Climate Smart Dairy Farming Model

At the production level, Solidaridad promotes smart dairy farming practices that support farmers to improve milk productivity, following climate smart technology. Smallholder producers are collectivized into cluster wise producer groups. These dairy producer groups are developed to support dairy farmers to improve their farm management practices and increase milk yield and quality. The producer groups and the clusters are being supported to develop and implement their business plans. Efficient dairy production system is being attributed by the combination of production technologies, mainly feeding, breeding and dairy cattle management. Towards promoting the adoption of good practices, farmers-to-farmers learning and technology transfer models have been established at the producer groups through the development of Lead Farmers. In collaboration with Bangladesh Livestock Research Institute (BLRI), Solidaridad promoted and initiated the production of Napier and Jambo fodder in the project locations. Keeping the limited arable land size in mind, hydroponic fodder cultivation technology was promoted to ensure availability of fodder during the dry season.



Solidaridad introduced Hydroponic Fodder cultivation – a Low Cost and Resource Efficient Technology for Improving the Productivity of Livestock

2. Creating Supportive Dairy Business Eco-System

To foster the dairy growth, Solidaridad is facilitating the development of commercially viable dairy business hubs with all relevant facilities to onboard one-stop dairy solutions. Self-employed service provisions have been introduced through entrepreneurship development for accessibility and affordability of quality services i.e. breed, fodder, feed, animal health and veterinary services. Solidaridad supported to develop 50 input shops and 13 milk collection centers to facilitate access to quality inputs and milk aggregation. Solidaridad also developed two Village Super Markets (VSM) in Jashore and Khulna that are acting as dairy milk hubs in the locality with the capacity to accumulate 15,000 liters of milk per day. These aggregation facilities are utilizing digital milk collection technology in collaboration with private sector to ensure best market price for the farmers.

Solidaridad is currently working on developing two digital solutions for digital financial inclusion and digital advisory services for the economic empowerment of women through:

- **Inclusion through Integration (i2i) App:** A digital application called the i2i app that will collect data from the milk collection centers (quality and quantity of milk delivered, and the sale price of milk thereof) and link up to mobile wallets of women farmers, such that women are directly able to get the money owed to them.

- **Interactive Voice Response (IVR) System for improved knowledge on good dairy farming practices:** An IVR system will send text and voice messages to women dairy farmers, providing information and training related to improved dairy farming practices. This will not only reinforce knowledge gathered during in-person training, but also allow for the information to be provided in a timely manner, based on the milk production cycle.

Solidaridad will expand and facilitate farmer-centric digital platform for supply chain transparency, financial inclusion and dairy advisory services. With the availability of resources and appropriate partnerships, the organization is committed to contribute towards SME development in terms of creating input suppliers, traders and livestock service providers including artificial insemination to suffice the local community for sustainable dairy development.

3. Developing an Integrated Value Chain

Solidaridad dairy business model is established on the principle of creating profitable business model for the farmers, rural entrepreneurs and private sectors to invest for supply of quality milk through the formal sectors. Solidaridad created transparent and stable trading relationships between dairy processors and farmers. To improve productivity, quality and market access, we work in each part of the value chain to make the chain self-sustaining. The integrated value chain is expected to create the following prospects for dairy enterprises, investment and social good:

1. **Business Case for Private Sector:** Solidaridad integrated value chain approach attracted the private sectors to reach organized farmers who will be able to supply quality milk at a larger volume in one central location for milk aggregation. This is reducing the transaction cost of the farmers, private sectors and supply chain actors to sell and source milk from particular locations. The effort has enhanced milk production in the concentrated areas and aided to maximize the utilization of private sector's milk processing facilities to ensure sustainable sourcing. Following a similar approach, private sector investments could be sustained in the milk pockets for a win-win business model. Currently, Solidaridad is partnering with BRAC Dairy to collect milk from 13 collection centers and 2 village super markets to facilitate milk supply to the end market.

2. **Economic Sustainability for Dairy Farmers:** In the integrated value chain, the dairy farmers are linked with the private sector milk processing companies where they get competitive price as per the milk quality on a regular basis. Farmers are being saved from price fluctuations and getting income consistently round the year.

3. **Employment opportunities for women and Youth within the Value Chain:** As the dairy value chain improves and move towards efficiency, employment are being created as service providers for inputs and technologies, entrepreneurs for milk value added products and vermin compost development, trading of milk and milk value added products. Solidaridad is providing support to develop a Women-owned Dairy Producer Company to enhance ownership, engagement and employability of women in dairy business. The proposed company is envisioned to demonstrate smart dairy business model to ensure sustainability of women dairy farmers in the community.

4. Fostering Public-Private Partnership for Investment

Solidaridad, in course of implementing the dairy intervention has developed business relationships with government agencies, private sector actors, research and academia and CSO organizations involved in dairy development. In a collaborative approach, Solidaridad works with these stakeholders to enhance the policy environment for dairy sector development and commercialization of innovative prototypes that are beneficial for the environment while creating livelihoods for the rural population.

- **Sustainability Framework for Dairy Development:** Solidaridad is collaborating with public private partners and agencies to develop a food safety and sustainability framework for the sectoral transformation. The framework would ensure the food safety aspect of dairy and dairy product to ensure nutritional benefits for the consumers. Along with this, the framework will provide guidance to ensure climate-smart farming and enhance productivity and quality of dairy products in Bangladesh.

- **Financial Inclusion:** Efforts include engaging financial institutions and service providers to co-create suitable financial products for marginal and smallholder dairy farmers, especially to motivate women farmers to expand their farms and sustain dairy businesses. Solidaridad has partnership agreements with a few commercial banks, i.e. Bank Asia, Dutch Bangla Bank, Social Islami Bank. These formal relationships could be leverages to support more farmers with inclusive financial services for dairy business development.

- **Technology Adoption to ensure quality and traceability:** Technology adoption in the supply chain to enhance transparency and traceability in product sourcing and quality management will be possible through successful partnerships with the supply chain actors. Solidaridad plans to explore and embrace technologies (i.e. use of QR code, block chain, etc.) to ensure tractability and quality of the dairy products to ensure its nutritional outcomes.

Women Dairy Farmers lined up for milk supply in the Solidaridad supported milk collection center (MCC). Digital Milk Analyzer is used to ensure quality supply of milk to the consumer and fair market price to the farmers

Solidaridad-supported women feed and input entrepreneur in the community

ANNEX 2 – Top 15 large-scale dairy farms

No	Company name	Abbreviation	Location	Distance (by Road)	
1	Bangladesh Milk Producers Cooperative Limited	Milk Vita	1. Bangladesh Milk Producers Cooperative Limited, Milk Vita Road, Pollabi, mirpur-6, Dhaka-1216 2. Baghabari, Shahjadpur, Sirajgonj	Satkhira to Factory Sirajganj to Factory	275 km 132 km
2	BRAC Dairy and Food Project	Aarong Dairy	BDFP Factory, Teen Sarak, Laxmipura, Joydebpur, Gazipur	Pabna to Factory Sirajganj to Factory Satkhira to Factory Rangpur to Factory	190 km 150 km 270 km 290 km
3	Pran Dairy Ltd	Pran Milk	1. Dairy Building, Ghorashal-Palash Rd. Pran Industrial Park, Bagpara, Palash, Narshingdi 2. PRAN Dairy Academy, Shahjadpur, Sirajgonj	Shahjadpur to Factory Pabna to Factory Rangpur to Factory	170 km 210 km 310 km
4	Farm Fresh		Akij Food Park: Barobaria, Dhamrai, Dhaka, Bangladesh	Pabna to Factory Satkhira to Factory	185 km 230 km
5	Amomilk	Igloo	Shyampur, Narayangonj	Sirajganj to Factory	180 km
6	Rangpur Dairy		Boldipukur, Mithapukur, Rangpur	Average	50 km
7	Aftab and Milk Producer Ltd	Aftab Milk	Mowchak, Kaliakair, Gazipur	Sirajganj to Factory	150 km
8	Akij Food and Beverage Ltd	Farm Fresh Milk	Akij Food Park: Barobaria, Dhamrai, Dhaka, Bangladesh	Pabna to Factory Satkhira to Factory	185 km 230 km
9	American Dairy Limited	MOO	Vangnahati, SreepurGazipur, Bangladesh	Own campus	
10	Baro Awlia Dairy Milk and Foods Ltd	Dairy Fresh	Dhaka – Sylhet Hwy, Rupganj Narayangonj.	Sirajganj to Factory	170 km
11	Danish Dairy Farm Ltd	Ayran	Shimrail, Siddirgonj, Narayangonj, Bangladesh	Own campus	
12	Ichhamoti Dairy and Food Products	PURA	Savar, Dhaka	Sirajganj to Factory	130 km
13	Uttar Bango Dairy	Ultra	Dhaka – Tangail Hwy Chandara, Gazipur	Sirajganj to Factory	120 km
14	Purbo Bangla Dairy Food Industries	Arwa	Savar, Dhaka	Sirajganj to Factory	130 km
15	Tania Dairy and Food Products	Safe			

Source: http://www.fao.org/3/bp227e/bp227e.pdf

ANNEX 3 – Forage crop seed and seedling selling companies/organisations

- Lal Teer Seed
- Supreme Seed
- Metal Seed
- Mollika Seed
- A. R. Malik Seed
- ACI Seed
- Giant Agro, Cosmap
- BRAC Seed Agro Enterprise

Producing Organization	Address	Phone
Siddiquis Seeds	11/A, 3/7 Main Road, Mirpur, Dhaka-1216.	01817-141-763 (Mobile)
Syngenta Bangladesh	Green Rowshanara Tower level-5&6, 755 Satmasjid Road, Dhaka 1205.	01677-127296
Meghdubu Agro	Bosils, Dhaka	01715786158
Khan Corn Silage	Horirampur, Manikganj	01712961297
Haychem (Bangladesh) Limited	Rabbee House Building # B, Apartment # B-1, House CEN(B, 11 Rd 99, Dhaka	01847-101131
BRAC Seed and Agro Enterprise	BRAC Centre, 75 Mohakhali, Dhaka	01712-863460
ACI Seed	ACI Centre, 245 Tejgaon Industrial Area, Dhaka 1208.	+88028878603

Source: https://bangladeshbusinessdir.com/agriculture/seed-company/

ANNEX 4 – Total feed production and availability

Total feed production and availability (Dry Matter – DM, Crude Protein – CP and Metabolizable Energy – ME) to livestock in Bangladesh

Feed resources	Production, fresh (1000 tons)	Production, DM (1000 tons)	DM availability to livestock (1000 tons)	CP availability to livestock (1000 tons)	ME availability to livestock (1000 MJ)
1. Crop residue					
Rice straw	45,123	40,628	18,316	549	64,098
Wheat straw	1,483	1,456	728	22	1,566
Maize straw	3,000	2,730	1,638	66	6,388
Potato leaves	17,037	4,259	3,833	153	12,267
2. Oil seed cacks/ meals	847	771	694	215	6,397
3. Pulses	270	243	219	35	1,531
4. Grains					
Rice	34,710	31,527	696	56	4,521
Wheat	1,348	1,213	142	20	926
Maize	1,000	890	89	8	579
Other cereals	2.82	2.4	0.24	0.1	156
5. Grain by products					
Rice police	3,220	2,898	232	32	1,159
Rice bran	2,777	1,522	213	213	6,542
Wheat bran	108	97	5.5	1	23
Broken rice	3,471	3,123	2,388	239	1,719
Pulses bran	657	858	46.8	7	281
6. Other by product					
Sugarcane tops	4,491	4,087	3,065	41	32,449
Sugarcane bagasse	4,491	4,087	3,065	41	32,449
Molasses	281	2	1.6	0.2	17
Banana leaves	706	141	113	5.6	1,121
7. Grasses					
Green grass	34,650	8,316	8,316	1.58	68,856
Sweet potatoes	782	391	156	28	782
Mango kernel	181	127	127	13	695
Total	**122,765**	**69,576**	**44,082**	**3,324.3**	**244,368**

Source: Sarkar et al., 2019

ANNEX 5 – Results from Dutch Company Survey

1. **ENG: How long have you been active in Bangladesh?**

   — **Company 1:** We already have contact with Bangladesh for a long time. We started exporting in 2020 for the first time. It looks like it is not becoming a continuing process of doing on business due to the governmental restrictions. In one year you can do export, then one year nothing and so on.

   — **Company 2:** Not yet, exploring the market. Local contact wanted project to explore if KI station was feasible. Difficult to find suitable RVO project form in this case, subsidy as loan was not suitable in this case, so initiative stopped.

   — **Company 3:** We would like to contribute to the report, but we are not yet active in Bangladesh. That is why we are looking forward to the RVO report and are very curious about the opportunities in this market

   — **Company 4:** We participated in a tender application with a consortium of companies. To date, we do not know whether the consortium has received the tender or not. In any case, we have not yet done business in Bangladesh.

2. **ENG: What is the biggest opportunity for your business area?**

   — **Company 1:** In Bangladesh there is a huge dairy population. Without having a (good) organized domestic semen production location and tested bulls, we are able to provide the product the farmer needs (good quality genetics).

   — **Company 2:** Selling semen

3. **ENG: What is the biggest challenge?**

   — **Company 1:** The biggest challenge is to get permission from the government to supply high quality genetics. At the moment cattle farmers in Bangladesh only can use domestic genetics which is poor quality. As long as the government blocks importation, the cattle farmers do not improve their herd. Normally together with exporting a product to a certain country, automatically knowledge is included. Without exporting products to Bangladesh do not get the education they need. The market should be (more) opened for importation of products. Then the farmers can choose if they want to use imported product or domestic.

   — **Company 2:** Not enough local knowledge: KI is not well known as option to improve.

4. **ENG: What is needed for doing more/better business?**

   — **Company 1:** Need of support from Embassy, Agricultural counsellor to do lobby to convince the Bangladesh government to create a more open market.

   — **Company 2:** Better health and fertility management on dairy farms needed: basic cow health management. Inseminating cattle with top semen on wrong moment makes it ineffective!

5. **ENG: For which other business areas in dairy of beef do you see opportunities in Bangladesh?**

   — **Company 1:** Cattle feed industry, Farm management industry, cattle housing industry, animal health. Besides this we also can look at the milk processing. When the farmer receives a correct price for selling milk, he can invest more in improving the farm. This means the milk processing industry should be involved as well.

   — **Company 2:** Cannot say, lack of local knowledge.

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This is a publication of
Netherlands Enterprise Agency
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T +31 (0) 88 042 42 42
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www.rvo.nl

This publication was commissioned by the ministry of Foreign Affairs.

Publication number: RVO-125-2023/RP-INT

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs and Climate Policy that implements government policy for Agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

Netherlands Enterprise Agency is part of the ministry of Economic Affairs and Climate Policy.