

Draft

Value Chain Analysis Report Deliverable #3

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AFC Agriculture and Finance Consultants GmbH
Baunscheidtstr. 17, 53113 Bonn, Germany
Tel.: +49-228-923940-00, Fax: +49-228-923940-98,
Email: info@afci.de

Services and Solutions International Ltd (SSIL)
Al Jamil OASIS, Level-1, 3, and 7, House 359, Road 4
Baitul Aman Housing Society, Adabor, Dhaka-1207, Bangladesh
Tel: Office: (+88-02) 48119798, (+88-02) 8190047
Email: info@ssibd.org

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Abbreviations and Acronyms

BDT	Bangladeshi Taka
BSTI	Bangladesh Standards and Testing Institution
BSCIC	Bangladesh Small and Cottage Industries Corporation
BLRI	Bangladesh Livestock Research Institute
CRI	Corporate Results Indicator
FO	Farmer Organisation
LGED	Local Government Engineering Department
MoFL	Ministry of Fisheries and Livestock
MT	Metric Tons
PIU	Project Implementation Unit (Divisional, District and Upazila)
PMU	Project Management Unit
LSPs	Livestock Service Providers
PAD	Project Appraisal Document
TMR	Total Mixed Ration
USD	United States Dollar
VMCC	Village Milk Collection Centre

Foreign exchange as at 12 September, 2022 USD: BDT = 95.00

Quantitative terminology: Lakh = 100 thousand. Crore = 10 million, or 100 lakhs

1.0 Executive Summary

The second component of the LDDP is the Market Linkages and Value-Chain Development (outlay US\$ 224.65 million). The objective of the component is to increase producers' linkage to profitable markets, improve the volume, quality and safety of livestock products being marketed, and reduce transaction costs along the value chains. It will comprise three sub-components: Market Linkages and Investments along the Value Chains, Critical and Climate Resilient Public Infrastructure for Livestock Development, and Consumer Awareness and Nutrition.

The AFC/SSIL consortium is providing support to LDDP in agribusiness planning, technologies and marketing advice and implementation support. The assignment involves the delivery of nine outputs, of which Value Chain Analysis Forms Deliverable 3. The present report has been prepared to fulfill the said contractual obligation. The analysis draws on secondary and primary data on four value chains, namely: Milk, Beef Fattening, Small Ruminants, and Backyard Poultry. These four value chains were selected by PMU, LDDP. A detailed intervention matrix has been identified and suitable recommendations made to improve the performance of each value chain.

This report followed a participatory form of enquiry which led to the identification of a number of constraints and opportunities for developing the livestock sector. Value chain analysis is a means of evaluating key elements of the livestock sector to understand where opportunities for improvement lie. These are grouped into the following categories:

- 1) Improve inputs in terms of quality and price,
- 2) Develop new products and increase production with technological upgrading,
- 3) Market development,
- 4) Improve efficiency of value chain,
- 5) Improve support structures and services for the sector, and
- 6) Improve the enabling environment.

At the end, the report presents an intervention plan for how to address the issues and provide solutions with a view to increasing employment and livelihood opportunities for small producers in Bangladesh. The main recommendations of the report are:

- Substitute highly expensive concentrate feed with nutritious fodder, wherever feasible.
- Promote product diversification through value addition in beef and milk products.
- Small producers are integrated into formal market through commercial milk hubs.
- Improve support structure and services -both governmental and private - for the dairy and livestock sector.
- Improve overall business investment climate so that foreign investors are attracted to invest in the country's livestock and dairy sector.

2.0 Background

Bangladesh is a fast-growing economy with a total population in 2021 of 166 million and an average growth rate of 8% - well above the Asian average, including India. It could shed its 'least developed country' status in five years. The country is pursuing industrialization led by export. Economic growth has largely been driven in Bangladesh by its exports of readymade garments, remittances by overseas workers and the domestic agricultural sector. The country aims to become an industrialized country by 2041. Invariably livestock and agriculture have important contributions to make.

Annex A provides a snapshot of the livestock sector in the country.

Livestock is an integral component of the complex farming system in Bangladesh as it serves as not only a source of meat and milk protein, employment and export earnings, but it also provides food security (Bangladesh Planning Commission, 2020). Livestock resources play an important role in the sustenance of landless people, livelihood options for marginalised families and are critically important for poverty reduction. Livestock provides direct employment for 20% of the population and indirect employment for another 50% of the population. It contributes 1.9% in National GDP and 16.5% in Agriculture GDP (DLS 2022). This sector employs 14% of the total labour force, which accounts for one-third of total agricultural employment. Over 70% of rural households are engaged in livestock production, which includes small holder and landless farmers. Dairy animals are also a major source of organic manure, an essential input in Bangladesh agriculture.

As per Table 1 below, the livestock population of Bangladesh is currently estimated to comprise 24.7 million cattle, 1.5 million buffaloes, 26.8 million goats, 3.75 million sheep, 311.8 million chickens and 63.8 million ducks (DLS 2022). It should be noted that indigenous breeds of poultry are generally small and have relatively poor egg production performance. However, two crossbred poultry farms, 'Rupali' (WLH Cock Fayomi Hen) and 'Sonali' (RIR Cock Fayomi Hen) have successfully evolved hybrids in Bangladesh which are well suited for backyard poultry. In addition, many private entrepreneurs have successfully established commercial poultry units.

Table 1: Livestock Population in Bangladesh (in lakhs) (2012-2022)

Name of Species	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Cattle	233.41	234.88	236.36	237.85	239.35	240.86	242.38	243.91	245.45	247.00
Buffalo	14.50	14.57	14.64	14.71	14.78	14.79	14.86	14.93	15.00	15.08
Sheep	31.43	32.06	32.70	33.35	34.01	34.68	35.37	36.07	36.79	37.52
Goat	252.77	254.39	256.02	257.66	259.31	261.00	262.67	264.35	266.04	267.74
Total Ruminants	532.11	535.90	539.72	543.57	547.45	551.33	555.28	559.26	563.28	567.34
Chicken	2490.11	2553.11	2617.70	2683.93	2751.83	2821.45	2892.83	2966.02	3041.06	3118.00
Duck	472.54	488.61	505.22	522.40	540.16	558.53	577.52	597.16	617.46	638.45
Total poultry	2962.65	3041.72	3122.92	3206.33	3291.99	3379.98	3470.35	3563.18	3658.52	3756.45
Total livestock	3494.76	3577.62	3662.64	3749.90	3839.44	3931.31	4025.63	4122.44	4221.80	4323.79

Source: DLS (2022).

Over the last ten years (2012-2022), the CAGR of total livestock was 2.15%, with total ruminants being 0.64% and poultry at 2.40%. Poorly performing indigenous cows, prevalence of disease, small land holding size, and lack of best management practices (BMP) are among the major factors impeding livestock production under all agro-ecological conditions in the country (Uddin et al. 2011). Bangladesh has one of the highest cattle densities – 282 large

ruminants/km², but this creates pressure on the already scarce feed resources. The majority of the cattle population in Bangladesh is comprised of native breeds which are poor in terms of milk and meat production. The average weight of local cattle ranges from 125 to 150 kg for cows and from 250-400 kg for bulls. These weights fall 25–35 percent short of average weights of all-purpose cattle in India. Milk yields in Bangladesh are also low, with averages of 200-250 liters during a 10-month lactation period comparing poorly with 800 liters in Pakistan (Bangladesh Planning Commission, 2020, p. 305), and 9,000 liters in the Netherlands, and 2,140 liters in Brazil.

Nevertheless, during the last decade (2013-22), production of milk, and meat have increased 2.58 times, and that of eggs 3.05 times. The production of milk reached 130.74 lakh metric tons (MT), up from 50.7 lakh MT in 2012-13. Meat production during the same period increased from 36.2 lakh MT to 93.65 lakh MT – an increase of 159 percent, while production of eggs grew from 761.74 crore pieces to 2,335.35 crore pieces – an increase of 207 percent per year (Table 2).

Table 2: Production of Milk, Meat and Eggs (2012-2022)

Products	Unit	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Milk	Lakh MT	50.7	60.92	69.7	72.75	92.83	94.01	99.23	106.8	119.85	130.74
Meat	Lakh MT	36.2	45.21	58.6	61.52	71.54	72.06	75.14	76.74	84.4	93.65
Egg	Crore No.	761.74	1016.8	1099.52	1191.24	1493.31	1552	1711	1736	2057.64	2335.35

Source: DLS 2022

During the seventh five-year plan period (2016-20), Bangladesh achieved self-sufficiency in meat and egg production. (Table 3). With increasing production, per capita availability of milk, meat and eggs rose to 193.38 ml/person/day, 136.18 gm/person/day and 121.18 pieces/person/year respectively in FY21 (DLS 2022).

The surplus in 2021 is partly the result of suppressed demand due to the adverse impacts of COVID-19 on income of many households.

Table 3: Demand, Production and Availability of Milk, Meat, and Eggs (2020-22)

Products	Unit	2020-21			2021-22		
		Demand	Production	Surplus	Demand	Production	Surplus
Milk	lakh MT	154.94	119.85	-35.09	156.68	130.74	-25.94
Meat	lakh MT	74.37	84.4	10.03	75.2	92.65	17.45
Egg	Crore no.	1765.92	2057.64	291.72	1785.68	2335.35	549.67

Source: DLS 2022

There remains an acute shortage of milk, though the gap between demand and production is reducing. However, the growth in demand for milk is growing very slowly. In the 2021-22 fiscal year, the production of fresh milk in Bangladesh was 130.74 lakh MT and the demand was 156.68 lakh MT. Due to supply constraints and lack of optimal quality enhancement, Bangladesh has to import milk and dairy products. According to Bangladesh Bank statistics, it spent US\$ 365 million in 2020, an increase from US\$ 250 million in 2015. Many companies in the processing industry, like sweetmeat and ice-cream producers, use imported bulk milk powder for its low cost. There are nine companies that supply milk powder to the markets. These nine companies are Milk Vita, Pran-RFL Dairy, Meghna Group (Fresh), Brac Dairy (Aarong), Abul Khair Group (Marks), Nestle Bangladesh (Nido), Arla Food (Dano), New

Zealand Dairy (Diploma), and Partex Group (Danish). According to the Bangladesh Bureau of Statistics, Bangladesh imported 150 lakh tonnes of milk powder for Tk 2,800 crore in fiscal 2018-19, the same year that 99 lakh tonnes of the dried dairy product were produced locally. The Bangladesh Dairy Farmers' Association (BDFA) has demanded that the duty on bulk field milk be increased from 25 percent to 100 percent and anti-dumping tax be imposed to protect the interests of the domestic industry¹.

As per estimates of BBS (2020), there are about 2.6 million cattle farms with an average herd size of 1–3 cows. Small holders² account for 89% of cattle, 91% of goats, 91% of fowl, and 90% of ducks in Bangladesh (see Table 4 below).

Table 4: Livestock and Poultry Classified by Farm type, 2020

	Cattle		Goat		Sheep		Fowl		Duck	
Farm Size	No. of HH	%	No. of HH	%	No. of HH	%	No. of HH	%	No. of HH	%
Small	2382622	89%	1475830	91%	97445	90%	3028744	91%	1743603	90%
Medium	276957	10%	135868	8%	10207	9%	274783	8%	175261	9%
Large	24660	1%	11880	1%	996	1%	23331	1%	15427	1%
Total	2684239	100%	1623578	100%	108648	100%	3326858	100%	1934291	100%

Source: Bangladesh Agricultural Statistics Year Book, Bangladesh Bureau of Statistics, 2020, pp. 527

In Bangladesh, 83.9 percent of total households possess livestock (livestock or poultry or both). About 45.9 percent of household's own cattle, and 76.3 percent possess poultry. On average, each household owns 1.52 bovine animals, 0.9 goat and sheep and 6.8 chicken and ducks³. Since animal ownership is largely in the hands of small holders, further investment in livestock will have a positive impact on income distribution. Furthermore, women own small ruminants and backyard poultry birds, which is a pillar of their economic empowerment.

Smallholder producers dominate the dairy sector in Bangladesh (Bangladesh Planning Commission, 2020, p. 305). More than 70% of the dairy farmers are smallholders (Baruah et al., 2021). About 90% of the produced milk in the country comes from cows, 8% from goat, and the remaining 2% from buffalo⁴. Hussain (2013) found dairy farms on an average yield 200–250 litres per 305-day lactation, i.e., 0.66–0.82 litres per cow per day, having 3.5 head of cattle. It is estimated that there are about 1.4 million dairy farms with an average herd size of 1–3 cows (Hemme et al. 2008). A study by Dutta et al. (2019) among 250 dairy farms in Satkhira found that dairy farms owned on an average 3.07 milking cows comprising 0.37 indigenous and 2.70 crossbred cows. Gradually, the indigenous cows and buffaloes are being replaced by crossbred cows which produce higher milk yields.

Average milk productivity was 7.80 litre per cow per day in which indigenous cow milk productivity was 1.9 liter per day and crossbred cow milk productivity was 6.48 liter per cow per day. The study found that average daily milk production increases with the size of the farm. Average daily production in large, medium and small dairy farms was 59.83, 32.40 and 5.45 liters, respectively. The average net return per cow was US\$ 58, this being the difference of monthly revenue of US\$ 79 and cost of milk production at US\$ 21 per cow.

¹ Source: [Local producers seek increased duty on imported milk powder | Dhaka Tribune](#), 6th May, 2019

² BBS (2020) does not define farm categories. However, Zaman et al (2010) defines landless holding <0.2 ha; Marginal 0.2-0.5 ha; Small 0.5 – 1.00 ha; Medium 1.01 – 2.00 ha; Large > 2.0 ha; pg. 40.

³ [Livestock - Banglapedia](#)

⁴ Alam, Jahangir. 2022 Milk: A Case for Import Substitution in Bangladesh, Daily Sun, 18th April 2022

The main constraints which bedevil the development of dairy, beef fattening, small ruminants and backyard poultry sector is summarised below in Table 5.

Table 5: Key Constraints in the Livestock Sector

Beef fattening and small ruminants	Milk and dairy	Backyard poultry
Lack of quality livestock meat breeds	Limited penetration of high yielding milk breeds, low milk price and high feed cost.	Shortage of quality chicks/dual purpose breeds
Limited skill of farmers in fattening livestock	Lack of training and know-how in animal husbandry, particularly HYV fodder cultivation, feeding, housing and management.	Limited knowledge of disease control
Scarcity of feeds and fodder, including lack of grazing land and high price of concentrates.	Lack of know-how to prepare nutritionally balanced rations.	Little use of feed additives ⁵ , shortage of quality feed ingredients.
	Lack of skilled labor and qualified personnel in smallholder dairy farming.	Backyard poultry is practiced at a subsistence level, not at a commercial scale
Limited skills of butchers.	A shortage of workers trained in Artificial Insemination, repeat breeding and reproductive diseases.	Lack of mechanized hatching and brooding (incubators)
Lack of organized marketing system for livestock and products.	Over dependence on village milk trader.	No organized markets for free range country chicken and eggs.
Limited credit support for capital equipment and modernization	Financing for dairy cattle available from only a few banks	Only grant in aid support from NGOs. MFIs do not finance backyard poultry activities.
Poor hygiene in slaughter houses.	Limited milk collection and processing facilities.	
Inadequate emergency veterinary care, medicine, treatment, vaccination, and extension services.		
Absence of market information		
Limited insurance coverage		

⁵ Feed additives are extensively used in commercial animal production to improve fattening/finishing due to enhanced intake, digestion and/or metabolism efficiency. Feed additives include minerals, antibiotics, vitamins, amino acids, enzymes, binders, acidifiers, and antibiotics.

3.0 The Livestock and Dairy Sector

Sectoral Regulations and Policy Framework

The key ministries involved in livestock and dairy development in Bangladesh are Ministry of Fisheries and Livestock (MoFL), Ministry of Agriculture, and Ministry of Food. The Department of Livestock Services (DLS) within the MoFL is playing a vital role in providing healthcare and animal husbandry services to livestock, extension and training to farmers, formulation of laws, regulations and policies with regard to the livestock sub-sector. The Ministry of Agriculture is the apex body for formulation and administration of the rules, regulations and laws related to Agriculture in Bangladesh. It also has a cadre of agriculture staff to provide extension services. The Bangladesh Food Safety Authority, under the Ministry of Food, is responsible for food safety regulation in the country.

Besides these three key ministries, there are several other departments which have a bearing on the livestock sub-sector. The Department of Environment, under the Ministry of Environment and Forests, specifies standards for pollution emission and penalises any violation endangering human life. The Bangladesh Standards and Testing Institution under the Ministry of Industries sets standards for animal feed, promotion of quality assurance activities, and rendering testing facilities for services and products.

The legal and regulatory regime for livestock management, food and food safety, and pollution control is governed by several enactments and government administrations. The legal framework of food safety of Bangladesh covers food regulations which are valid for products produced in Bangladesh and imported and exported to foreign countries.

In Bangladesh, a slaughter act has been in effect since 2011, which defines rules, regulations, and restrictions for slaughter. Further, the Animal Feed Act, 2011, and associated rules of 2013, provide the important legal framework to control formulation, distribution and marketing of animal feed. However, companies active in the livestock sector are neither adequately aware of these acts, nor is there strong enforcement by the government.

The Bangladesh National Parliament enacted the Food Safety Act, 2013, to counter threats related to food safety. The act came into effect in February 2015. It defines coordination mechanisms between different public authorities and establishes basic definitions, goals and principles for food safety. The act has given the Bangladesh Food Safety Authority (BFSA) regulatory control over food safety and food quality. The three main tasks the BSFA is authorized to fulfil are supervising, risk management and risk communication. The legal framework applies to domestically produced products as well as imported and exported products.

The 'Animal Disease Rules' Act and the 'Bangladesh Avian Influenza Compensation Strategy and Guidelines' exist to combat avian diseases and compensate farmers in case of a disease outbreak. The Bangladesh Environmental Conservation Act, 1995, associated Environmental Conservation Rules, 1997, and the Environmental Court Act, 2000, are important regulatory instruments for pollution control and environmental conservation. To increase productivity, the National Breeding Policy, 2019, advocates artificial insemination of native dairy breeds with Holstein Friesian semen.

However, overlapping jurisdictions of regulatory bodies and a lack of inter-ministerial coordinating mechanisms covering various categories of food and agricultural products can often create a chaotic and confusing administrative tangle, diminishing the goal of livestock development and food safety. Enforcement of food safety laws and regulations remain weak

due to a lack of enforcement staff, administrative will, and unclear food quality and standardization control systems. Recently Bangladesh Agricultural University (BAU) at Mymensingh, started to enroll students in 4 year's undergraduate course in December, 2018 to offer Bachelor Degree in Food Safety Management for the first time in the country so in near future the BFSA will be able to employ technically sound manpower to handle the food safety issues.

Shortages of feed and fodder, poor husbandry practices, high incidences of livestock diseases, poor genetic makeup of native breeds of cattle, and inadequate service delivery to the farmers are some of the major constraints to the livestock sector. Most of the animal feed and fodder come from agriculture in the form of crop residues and grain by-products. Fodder required for milk production is commonly obtained from small-holder farmers. Dairy feeds are generally derived from forages, coarse roughages and by-products not utilized by human beings.

However, during the last two decades cultivation of HYV fodders got popularity among the farmers and therefore cultivated fodder production is increasing. Mainly Napier grass and to some extent German grass and Jumbo grass cultivation has become popular. Not only Napier grass but also its other high productive varieties (Pakchong, Hybrid Napier etc.) are being cultivated by commercial as well medium scale farmers. However, introduction of other new varieties of Napier grass need to be increased. in order to increase the productivity and nutritional value of green fodder for dairy and beef cattle in Bangladesh. About 70 – 80% of total costs in the production of milk is the feed cost. Increases in green fodder production based on improved varieties can potentially help to minimize the use of expensive 'concentrate feeds' (such as cereal grains + vegetable protein meals, or commercially produced pellets or meals) for dairy and beef cattle, and this will be a means of decreasing the cost of production of milk and meat. Small holder mixed farms are the main producers of milk and integration of legume fodder production with food crops will be another way of increasing on-farm fodder production. This has been validated in the rural smallholder farmers where it was found that integration of legume fodders (*Lathyrus sativus* and *Sesbania rostrata*) with rice production increased milk yield by 15 – 20% and rice production by 7 – 13% without hampering crop rotation process (Akbar et al., 2005).

Conservative Food Habits

Food is a major past time of Bangladeshis. All festivities involve lavish doses of meat-based delicacies, and sweets. The main ingredients are rice and marinated meat (beef, mutton, or chicken) cooked in lots of spices, giving it its special taste. The spices are nutmeg, mace, pepper, bay leaves, cinnamon, cardamom, cloves, coriander, mint, ginger, onion, tomatoes, green and red chillies, and garlic. It is sometimes served with a boiled egg and salad. Celebrations are incomplete without sweetmeats. A huge variety of sweetmeats are produced in the country; some traditional items enjoy good branding based on geographical provenance, style of preparation, and ingredients chosen (see Table 6 below). Use of imported milk powder is common in sweetmeat preparation. Hygienic sourcing of raw meat is not a major consideration for consumers. Milk is consumed by infants and old. Illegal use of formalin to preserve shelf life of milk has met strong consumer disapproval, and selective government action to root out the menace. Frozen meat is frowned upon. Salami, cheese and ready to cook meat are making inroads among the elite, but not the masses.

Table 6: Traditional Meat and Milk Products

Meat cuisine		Sweets	
Beef or Mutton	Chicken	Mishti doi	Niche products
- Kacchi biryani - Bhuna khichuri - Haleem - Kala Bhuna - Seek kabab	- Moorg pulao - Grilled chicken	- Ras malai - Borhani (yogurt)	- Porabari Chom of Tangail - Monda of Muktagacha - Doi of Bogura - Rasmalai of Comilla - Kacha Golla of Natore - Sweetmeat of Jamtala, Jessore

Stakeholders Involved in Livestock and Dairy Sector

Several stakeholders are involved in the milk production process. Farmers are the main stakeholders in milk production. Others include commercial feed manufacturers, feed supplement shops, forage seed/seedlings producers and suppliers, veterinary medicine suppliers, service providers such as veterinarians, Artificial Inseminators (AI), AI Centers of DLS, NGOs, private veterinarians, insurance agencies, breeder farmers, training institutes/organizations, etc. Then there are milk collection centers, chilling centers and dairy plants who are involved in collecting, processing, and marketing of milk. There are about 14 dairy processing plants who procure, process and market dairy products in the urban markets. These dairy processing plants are mainly collecting milk from the nearby districts of Dhaka. But there are also small dairies which serve to the local community. The informal sectors such as sweetmeat shops are major consumers of raw milk. They use up to 75% of the milk for preparing and marketing different kinds of sweets.

Unfortunately, high costs of production, poor milk hygiene and poor quality of milk are central issues in the small holder dominated dairy industry. High costs of production represent a threat that could lead to large dairy processing industries switching to imported milk powder, instead of procuring fresh milk from local farmers. Low quality milk also may not be attractive to dairy processing industries, as to produce high quality dairy products, good quality raw milk is needed. So, to make the dairy sector more attractive and more profitable with high quality products, the responsible role of each actor involved along the complex value chain, from milk farmer level to processor level, is crucial. Actors in this complex value chain can play an important role in decreasing production costs and improving the quality of milk and milk products in the country. Capacity building of these value chain actors and increasing their role in terms of improving production efficiencies and the quality of milk is urgently needed.

Some of the key stakeholders in the Bangladesh Livestock Value Chain are mapped in Annex B.

Public – Private – NGO Collaboration

A significant feature of the Bangladesh livestock sector is the blending of efforts of the government, private sector, and NGOs. The Bangladesh government steers the development of the livestock sub-sector through three organizations:

- The Ministry of Fisheries and Livestock (MoFL), responsible for setting policy perspective and creating an enabling environment;
- The Department of Livestock Services (DLS), responsible for providing veterinary coverage, development, support and extension services; and

- c) The Bangladesh Livestock Research Institute (BLRI), responsible for conducting research on genetics, feed, on-farm testing of technologies, diversification of inputs and products and their value addition.
- d) The Agricultural Universities are conducting research on different aspects of livestock development and are involved in technology development and dissemination activities.

Over the last three decades, the private sector has emerged as a major market player. The poultry sector, due to significant policy and technological interventions in the 1990s, has provided improved breeds, feeds, housing, equipment, technology, and management services which has increased poultry meat and egg production. The DLS has developed a new poultry hybrid called 'Sonali', capable of producing both meat and egg, which is now very popular.

Leading NGOs such as BRAC and Proshika, the large commercial operation Aftab Bohumukhi Farms Limited (ABFL) and Grameen Bank have contributed significantly to the development of the poultry industry in Bangladesh through distribution of chicks, and mainstreaming millions of women with income generating activities with sustainable impacts on income, improved dietary standards, and empowerment. ABFL is an integrated contract farming system which has significantly benefitted many small poultry farmers (Sheel and Sen, 2013).

The dairy sector has also shown significant improvements from policy intervention. Milk production has increased due to increased usage of cross bred cows. In addition, the use of deep-frozen semen for artificial insemination has significantly improved cattle breeding programs. Small scale dairy farming has also increased due to the introduction of modern milk processing and packaging techniques. Successful examples of dairy industries include Milk Vita, BRAC-Aarong, and PRAN. Milk Vita is the brand name of Bangladesh Milk Producers Cooperative Union Limited. Milk Vita pioneered primary cooperatives to collect milk from small producers and process it in manufacturing plants. Milk Vita is 3 tier cooperative organization with 2800 Primary Milk Producing Cooperative Society (Tier 1) ; 71 Central Milk Producing Cooperative Society (Tier 2) and a National Society (Tier 1). Dairy products ranging from pasteurized liquid milk, butter, powdered milk and ghee, etc., are marketed through Milk Vita retail outlets. PRAN and BRAC-Aarong directly collect milk from producers, and also provide them with training and credit support for the purchase of improved cattle breeds.

Strong collaboration between public-private-NGO entities can encourage sustainable livestock value chain development among small producers in Bangladesh. Strengthening the weak financial structure, reducing power imbalances in the governance structures and low political intervention in community-level organizations, and resolving socio-cultural and environmental concerns are the major challenges for the improvement of value chains in Bangladesh.

SWOT Analysis of Livestock Sector

The following is a summary of the strengths, weaknesses, opportunities, and threats for the livestock and dairy sectors of Bangladesh (see Table 7 below).

Table 7: Summary of SWOT Analysis of Bangladesh Livestock Sector

Strengths	Weakness
- Long-term Government support. 12-15 people households are involved in livestock keeping. - Private sector is contributing to livestock development.	- Low price of milk in relation to production cost. - Milk yield rates are lower than other countries in South Asia (FAO, 2020a).

Policy makers are now paying attention to livestock sector development	- Quality feeds are in shortage and are highly expensive. - Small producers suffer due to limited technical knowledge and skills. - Lack of organized marketing facilities
Opportunities - Breed improvement. - Significant scope for women and youth engagement. - Modernizing slaughter facilities, packaging, and cold chain. - Enhancement of bank credit guarantees for livestock loans to small producers. - Introduction of index-based livestock insurance to reduce smallholders' vulnerability and risk from natural and man-made disasters. - Incentivize commercial production and marketing of Napier and jumbo grass. - Opening of Padma bridge will ease congestion of road and rail links with Southern districts of Bangladesh, also eventually peripheral countries like India, Nepal, and Bhutan and create a holistic trade network.	Threats - High input costs. - Persistence of COVID-19 pandemic and disruption to supply chains. - Reduction in land for fodder cultivation. - Rising transport costs due to high fuel costs, extortion and traffic jams. - Emergence and re-emergence of animal diseases, which cause 15 percent of bovine and 20 percent of poultry mortalities. - Poor availability of vaccines. - Natural calamities destroying livestock. - Inadequate regulatory staff to monitor quality of imported and domestic products, processing, and marketing.

4.0 Analytical Framework

The analytical framework adopted in this report is influenced by Vision 2041 of Bangladesh, its 8th Five Year Plan (2021-2025), the need for building robust global value chains as espoused in World Bank report 2020 (a), and ILO manual 'Value Chain Development for Decent Work – A Guide for Development Practitioners, Government and Private Sector Initiatives' (2009). The aim of Vision 2041 is to end absolute poverty and to be graduated into higher middle-income status by 2031, and eradicate poverty on way to becoming a developed nation by 2041 (Bangladesh Planning Commission (2020). Bangladesh's 8th Five-Year Plan (2021-2025) aims to attain 8.51 percent GDP growth and reduce the poverty rate to 15.6 percent at the end of this period (Bangladesh Planning Commission, 2020). Both Vision 2041 and the 8th Five Year Plan would require the dairy and livestock sector to raise its growth rate from a current 3.4% to over 8% and become export oriented and globally competitive.

An export-oriented livestock economy participating in a global value chain (GVC) could potentially be powerful of productivity growth, job creation, and increased living standards (World Bank, 2020). GVCs offer an opportunity for countries to leap frog their development process by importing skills, technologies, and by aligning their GVCs with their national development strategies. The right strategies can help Bangladesh maximize its participation in a global livestock value chain.

This study applied the participatory value chain development methodology of the International Labour Organisation (ILO), Geneva, which is one of ILO's main tools for employment creation. It bases itself on the ILO manual 'Value Chain Development for Decent Work – A Systems Approach to creating more and better jobs (ILO, 2021) which is a well-tested tool that can be initiated rapidly. The work was initiated with sensitization of stakeholders concerning value chain approaches and how to conduct a participatory value chain analysis, following the approach of the ILO guidelines. The report team undertook data collection, conducted

extensive interviews, and held focus group meetings with stakeholders, including market actors and target groups.

Methodology

The study approach (Figure 1) commenced with an extensive literature review. The secondary literature included sector and subsector studies, policy documents, published articles, project reports, and government publications, in order to gain a preliminary appreciation of the production, technology, regulations, and market dynamics. In-depth interviews with two dozen key informants were held to understand the livestock potential and the ways of future interventions (See Annex C for a list of key informants). The purpose of the in-depth interviews was to collect facts and inform views on the livestock sector. Telephonic and face to face survey was used to generate the data and information about the present prevailing practices from farmers and traders engaged in milk trading, beef fattening, goat and sheep rearing and backyard poultry production. The collected data was analyzed using simple statistical tools. Analytical tools used were chain mapping, and economic parameters (e.g., profit margin, gross margin and value share).

In order to have a visual representation of the whole chain, value chain maps were developed to illustrate the channels through which product flows from production stage and finally to the consumer through traders. Since small producers are the key target groups of the LDDP, the focus has been on the interactions between small producers and the immediate market players. Chain mapping was employed with quantity and price recorded in transactions between the producer and village trader. Economic parameters like profit margin were used to analyze gross margin and added value share across the chain.

Focus Group Discussions (FGDs) were conducted with producers and village traders to better understand the functioning of value chain from their perspective. A common set of questions were used to guide the FGDs in each value chain (see Annex D1 for the FGD questions).

Figure 1 below sketches the methodology applied during the present study.

Review of literature	•Secondary information, livestock related documents
Key informant interviews	•Industry experts, market actors, NGOs, LDDP staff
Field and telephone survey	•Farmers, traders
Focus group discussions (FGD)	•Producers to validate the data and information collected through questionnaire surveys
Data Analysis	•Average, Tabular analysis, extrapolation
Reporting	•Drafting, results sharing and feed back, and final report submission

Figure 1: Methodology Adopted for Value Chain Study

5.0 Literature Review

The term Value Chain refers to the fact that value is added to preliminary products through the combination of other resources (for example tools, manpower, knowledge and skills, other raw materials, or preliminary products). As the product passes through several stages of the value chain, the value of the product increases. According to Taylor (2005), value chain thinking requires a broader understanding of an entire chain – all processes that transform raw material into a final product - and all actors involved in the value creation. This comprehensive approach to all elements of the value chain helps map all the stakeholders' products and services that are relevant and in demand, while creating an atmosphere of collaboration that fosters innovation and mutual gains. It also strengthens the market system, which increases competitiveness, resilience, and interdependence.

Taking a value chain approach to economic development and poverty reduction, LDDP wishes to identify and address major constraints and capitalize on opportunities faced by input suppliers, producers, processors, traders and other businesses at multiple levels and points along a given value chain. Moktadir et al. (2019) observed that interactions between the key performance indicators like Government support, availability of raw material and skilled labor, and the adoption of environmental and labor safety regulations will help the Asian countries to develop sustainable value chains. The solution following from this approach will inevitably lead to a wide range of solutions such as improving access to necessary inputs, building the capacity and skills of workforce, improving efficiency of the value chain, integrating small producers into the formal delivery of business and financial services, addressing information asymmetries, facilitating and expanding market access, or promoting value-added products. Value chain analysis identifies opportunities and constraints of a particular commodity and ways to achieve market integration. The end result is an intervention matrix that that proposes various solutions addressing identified opportunities and constraints.

Since the mid-1990s, governance of value chains has emerged as an important area of debate in global commodity chains (Gereffi et al. 2005). The asymmetry of power relations in the value chain is in affect the relationship between the lead firm and the other actors in the supply chain. The power is exercised through a) the information flow along the value chain for activity coordination, b) the degree to which this information is codified and shared among participating institutions and c) the degree to which suppliers are capable of meeting conditions imposed on them (Fearne et al.2009, Kaplinsky and Morris, 2000).

In the real world many factors shape the functioning of Value Chain Management (VCM). Harvard University Prof. Michael Porter laid out his method of analyzing value chains in his seminal 1985 book *Competitive Advantage*. This report has adapted Porter's five factors to analyze the livestock and dairy value chain in Bangladesh. The five value chain drivers that have strong bearing are depicted in Figure 2, namely System Efficiency, Product Quality, Product Differentiation, Social and Environmental Standards, and Business Environment.

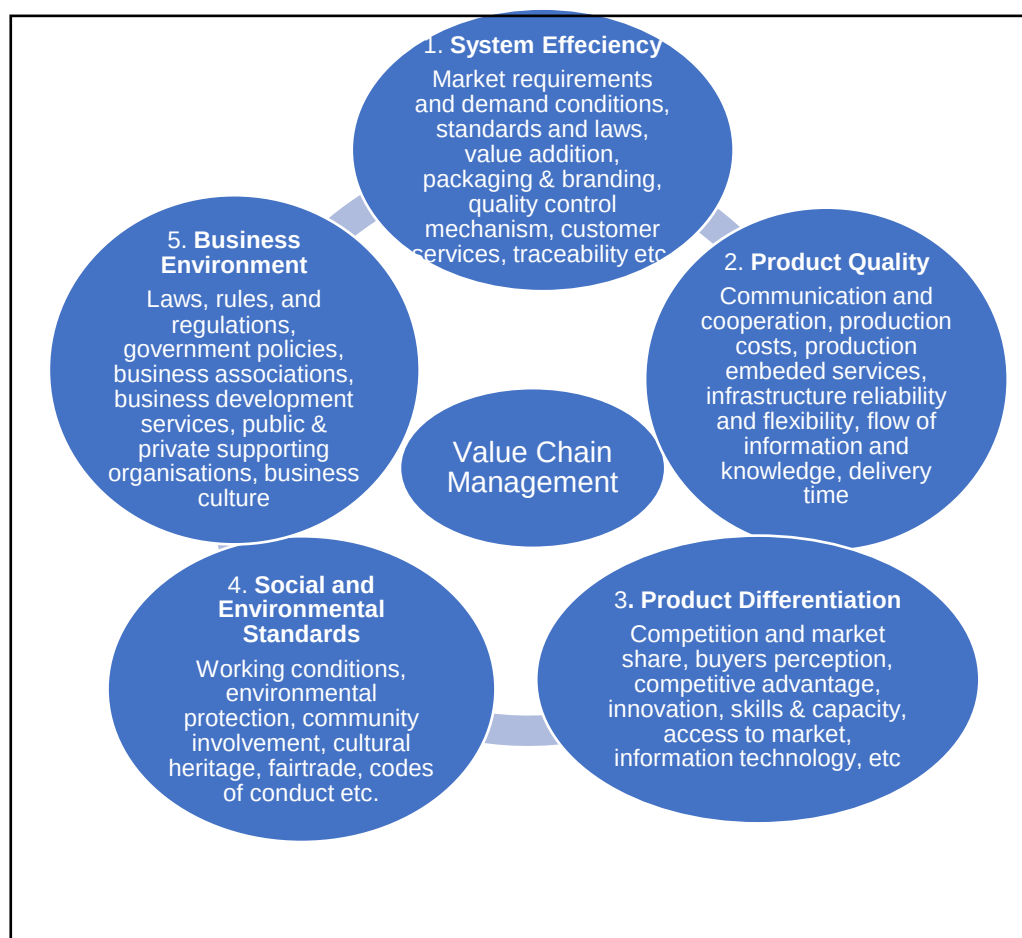


Figure 2: Five Levers of Value Chain Development

The first lever is **System Efficiency**, which refers to how existing processes use resources in the best way possible to ensure the fast, smooth running of collection, production, processing and distribution of all livestock products and services. An efficient supply chain is one that makes optimal use of available resources including financial, human, technological or physical. At the level of small producers, Days of Sale (DOS) can be considered as a measure for estimating efficiency in supply chain. DOS is calculated by dividing the average inventory on hand (as value) by the average monthly demand (as value) and then multiplying it by 30, when measuring on a monthly basis. Since milk and meat are both perishable items, farmers do not stock up meat or dairy products, hence the inventory build-up is minimal, and the current system is quite efficient.

The second lever is **Product Quality**. Product quality refers to how well a product satisfies customer needs, serves its purpose, and meets industry standards. When evaluating product quality, businesses consider several key factors, including whether a product solves a problem, works efficiently or suits customers' purposes. Customer experience is becoming the most important factor in dairy chain success. Concerns about **food safety** is emerging as the most important factor for success in the dairy supply chain – even more important than low price – and an important source of product differentiation.

The third lever is **Product Differentiation**. In marketing, product differentiation is the art and science of distinguishing a product or service from others, to make it more attractive to customers in a particular market segment. This involves differentiating it from competitors' products as well as a firm's own products (see Table 8 below). The industry leaders in

Bangladesh are engaged in adding value and increasing the shelf life of milk and dairy produce through collecting, processing, packaging and distributing ready-to-eat products to thousands of consumers at home and overseas.

Table 8: Examples of Product Differentiation in Dairy Segment

Product Differentiation	Features, warranty, durability, performance	Aarong offers a large number of varieties in each dairy product - butter (2), cheese (16), flavored drinks (8), ghee (4), liquid milk (14), low fat products (5), milk powder (7), sweets (9), yoghurt (9), and yoghurt drink (3). Besides a large product range, brands also offer products in tetra packs, polythene bags, and disposable bottles.
Service differentiation	Ordering ease, customer training	Milk is an essential daily need. Milk is available in all neighborhoods in packets of 1000 ml, 500 ml and 250 ml. However, training of general customers or chefs is remarkably absent in Bangladesh.
Channel differentiation	Coverage, expertise, performance	All brands use departmental stores, small groceries, confectionaries, and superstores. Aarong has strong online presence.
Relationship differentiation	Perception, advertising, communication	In September 2020, PRAN Dairy obtained a US\$ 10 million loan from Asian Development Bank to continue to procure raw milk from the 12,000 smallholder dairy farmers within its value chain, and further expand to another 1,200 farmers who would otherwise lose income due to disruptions caused by COVID.
Price Differentiation	By customer, by quantity, by segment	In Bangladesh, market leaders tend to price their products lower than that of the new comers. For instance, Milk Vita and PRAN pasteurised milk (500 ml) is 38 Taka, compared to Baqarah Pasteurized Milk (Eon Group) 65 Taka.

The fourth lever is adherence to **Social and Environmental Standards**. Milk Vita has distinguished itself by being a farmer and consumer friendly choice for millions of ordinary citizens. It has championed farmer access to market channels, creating fair and transparent pricing systems, educating customers, and stimulating demand for a diversified range of products, and reducing losses in the supply chain.

The fifth lever is **Business Environment**. Undoubtedly, regulatory and policy framework affects the performance of the overall sector, particularly the value chain's ability and motivation to acquire knowledge and then translate it into actionable management decisions. Unfortunately, the lack of cold storage facilities, weak enforcement of food safety laws, and liberal imports of milk powder has somewhat reduced the competitiveness of the Bangladesh dairy industry.

6.0 Analysis of Selected Value Chains

Four value chains were selected by PMU of LDDP for further elaboration. The rationale behind the selection of dairy, beef fattening, small ruminants and backyard poultry value chains is that small, unorganized farmers dominate this segment of the livestock economy. Of the total 15,099,086 farm holdings, 13,361,350 are small farms having 0.5 - 2.5 acres (approximately 88% of the total), and 1,560,774 are medium holdings having 2.5 - 7.5 acres (approximately 10% of the total) (Quayyum 2018, pp 18). Small producers account for over 90% of milk, and

80% of live animals (cattle, goat, sheep, and poultry) in the national supply chain. The majority of rural households are employed in livestock business, with nearly 1.2 million households – 40 percent women – engaged directly or indirectly in the poultry sector.

Data from producers and village traders were collected by telephone, and field visits in May to July 2022. FGDs were conducted with members of producer groups in each value chain to understand their perspectives on challenges faced and possible solutions.

6.1 Dairy Milk

According to a study by Ayeshi et al. (2021) by Light Castle, 91% of milk is handled by the informal sector, while 9% is managed by the organized sector. Smallholder dairy producers are the starting point of the value chain. They are the person or household, often landless or without assets, involved in milk production for economic return on surplus milk, and usually owning up to two cows. Family labor is the only source of labor for this group. In most cases, women are responsible for cleaning the cowshed, feeding, and milking. Women are more involved in income-generating activities. Thus, their contribution is at the farm production level, and they also make a significant contribution to sales and distribution, and decision-making in the dairy value chain.

The Bangladesh dairy value chain can be categorized into two models: the informal sector, and the formal organized sector. An important characteristic of the informal sector is that the milk directly goes to consumers from producers. One of the major issues of dairy producers is the low price of milk paid at the farm gate. Intermediaries are involved in this system. They purchase milk at low prices from the producers and sell in the city to consumers at much higher prices. A farmer receives 35-40 BDT for a liter of milk depending on the fat content, whereas the cost of production is on average 43 BDT, driven by rising prices of fodder and concentrates. Low prices act to discourage farmers to produce milk for industrial processors and maintain a high quality of milk.

The dairy sector is moving towards corporatization through the growth of industrial processors of dairy products. In the formal division of the market, there are both cooperatives and corporates. Even in the early 1970s, the Government felt the need to collectivize milk producers. The government-run cooperative organization Milk Vita pioneered the corporatization of dairy in Bangladesh in the '70s by setting up a milk processing plant and starting various uses of milk. The government also imposed import tax on milk powder and provided duty draw backs for dairy machinery imports, leading milk's corporatization to boom.

Currently, there are over two dozen large dairy companies. The well-known brands are Bangladesh Milk Producers' Cooperative Limited (Milk Vita), BRAC Dairy and Food Project (Aarong Dairy), Pran Dairy Ltd (Pran Milk), Aftab Milk and Milk Producer Ltd (Aftab Milk), Akij Food and Beverage Ltd (Farm Fresh Milk), Ultra Shelaiddah Dairy, Rangpur Dairy, Ichhamoti Dairy and Food Products (PURA), Baro Awlia Dairy Milk and Foods Ltd (Dairy Fresh), American Dairy Limited (MOO), Danish Dairy Farm Ltd (Ayrar Igloo Dairy Limited (Igloo), Purbo Bangla Dairy Food Industries (Arwa), Cowhead Pure Milk (Cowhead), and Tania Dairy and Food Products (Safe). Some of the other upcoming brands are Tulip Dairy, Dutch Dairy, and Eon Dairy (Bakra). Grameen Danone is a force to reckon with in the yogurt segment. The efforts for corporatization of the milk market have resulted in an oligopolistic structure. Milk Vita dominates with 40% market share in the pasteurized milk market, followed by Pran and Aarong with a 24% market share each.

The dairy companies have established a web of milk hubs in the country. Currently, there are 300 chilling units owned by Milk Vita, PRAN, Brac-Aarong, EON and Akij with a total capacity of 1,057,026 Litre/day or 3,523 LPD per unit. The chilling units are concentrated around Dhaka and Rajshahi. Sylhet has no milk chilling unit (see Table 9 below).

Table 9: Milk Chilling Capacity of Selected Corporate Dairies

	Milk Vita		PRAN		Aarong		EON		Akij	
Division	No. of Chilling Centres	Capacity LPD One time	No. of Chilling Centres	Capacity LPD One time	No. of Chilling Centres	Capacity LPD One time	No. of Chilling Centres	Capacity LPD One time	No. of Chilling Centres	Capacity LPD One time
Barishal	2	4,000								
Chittagong	6	25,500								
Dhaka	17	196,000			6	21000				
Khulna	12	35500	17	22000	26	26			13	57000
Mymensingh	3	5,500								
Rajshahi	9	205,500	72	107000	53	156000			22	93000
Rangpur	9	41,000	17	32000	15	26000	1	30000		
Sylhet										
Total	58	513000	106	161000	100	203026	1	30000	35	150000
Avg. per plant		8845		1519		2030		30000		4286

Source: Compiled from response of companies.

Smallholder milk producers in rural areas sell their milk in two ways, i.e., to the milk businessman (collector) or directly to the rural market. Most of the producers (75 percent) are women. In formal value chains in rural areas, milk collectors sell to the nearest chilling plants and then the milk goes to the urban market after processing (Kabir et al. 2018). In informal (local) value chains, the collectors sell milk to the local trader or wholesaler. The traders then sell the milk to local tea shops, restaurants, and local markets (see Figure 3 below).

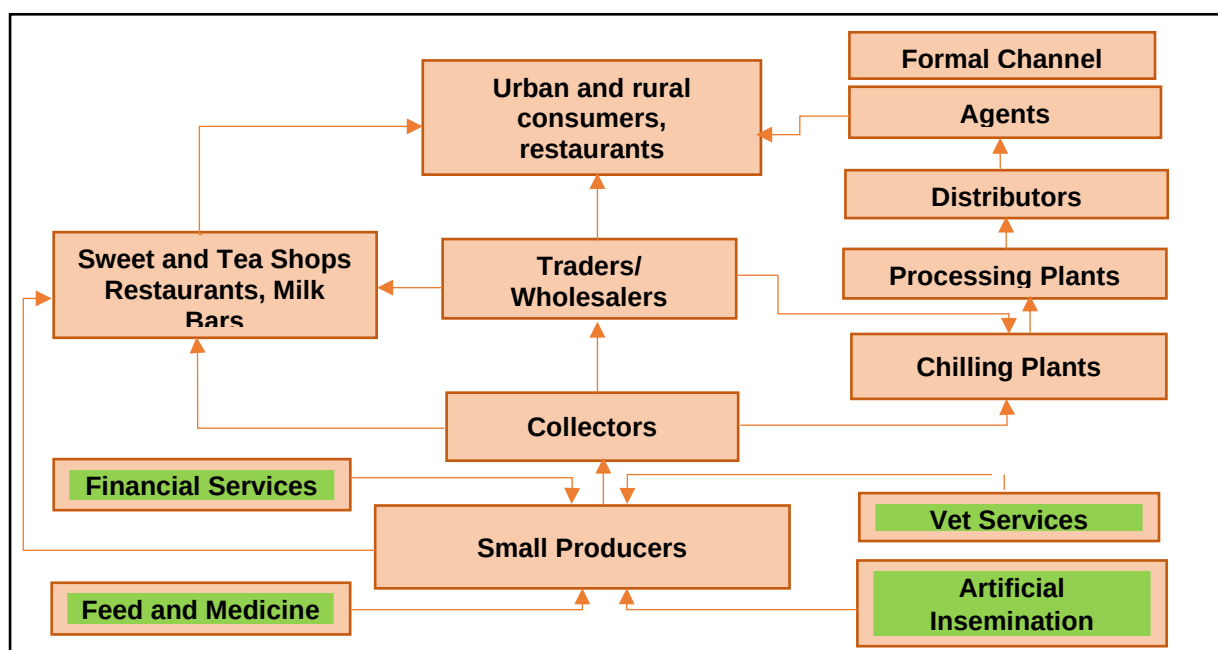


Figure 3: Dairy Value Chain

A survey of 160 producers in 16 districts of 8 divisions revealed that they receive on an average 43 Tk for a liter of milk. The milk is procured by village trader, intermediaries (Ghosh), and dairy companies like Milk Vita, Aarong, or PRAN. The value addition on per liter of milk produced and traded is presented in Table 10 below.

Table 10: Value Addition by Producer and Village Trader per liter of Milk (BDT)

A. Producers									
Divisions	Barisal	Chi'gong	Dhaka	Khulna	M'singh	Rajshahi	Rangpur	Sylhet	Avg./Total
No. of districts covered	2	3	3	2	2	2	1	1	16
Sales price (BDT)	43.3	44.5	45.2	43.7	45.1	44.3	44.6	42.5	43.8
Feed cost (BDT)	39.1	39.5	40.4	39.7	40.1	40.1	39.4	39.0	39.5
Medicine cost (BDT)	0.7	0.8	1.0	1.1	0.7	1.5	1.5	0.6	1.2
Marketing cost (BDT)	0.9	0.8	0.5	0.9	0.8	0.5	0.5	0.8	0.6
Total cost (BDT)	40.6	41.0	41.9	41.6	41.6	42.1	41.4	40.4	41.3
Gross Profit (BDT)	2.7	3.5	3.3	2.1	3.5	2.2	3.2	2.1	2.5
Gross Profit as % of sale	6%	8%	7%	5%	8%	5%	7%	5%	6%
Total no. of respondents	20	30	30	20	20	20	10	10	160
B. Traders									
Divisions	Barisal	Chi'gong	Dhaka	Khulna	M'singh	Rajshahi	Rangpur	Sylhet	Avg./Total
No. of districts covered	2	3	3	2	2	2	1	1	16
Purchase price of milk	43.3	44.5	45.2	43.7	45.1	44.3	44.6	42.5	43.8
Marketing cost	0.8	1.6	1.4	1.8	1.7	1.6	0.8	1.8	1.4
Total cost	44.1	46.1	46.7	45.5	46.7	45.9	45.4	44.2	45.2
Trader's sales price	48.0	48.4	48.9	48.3	49.2	48.8	48.7	48.7	48.7
Gross profit (BDT)	3.9	2.3	2.2	2.9	2.5	3.0	3.2	4.4	3.1
Gross Profit as % of sale	8%	5%	5%	6%	5%	6%	7%	9%	6%
Total no. of respondents	6	9	9	6	6	6	3	3	48

Average gross profit on sale of a liter of milk is 6% both for producers and traders. Feed cost including concentrate and fodder accounts for 90% of all expenses. Steps to reduce feed cost will greatly help the producers. Average sale price of milk by traders is 48.7 BDT. Figure 4 below graphically depicts inter-divisional variations in milk price. The profitability for milk traders is highest in Sylhet, perhaps due to lack of milk hubs in the division.

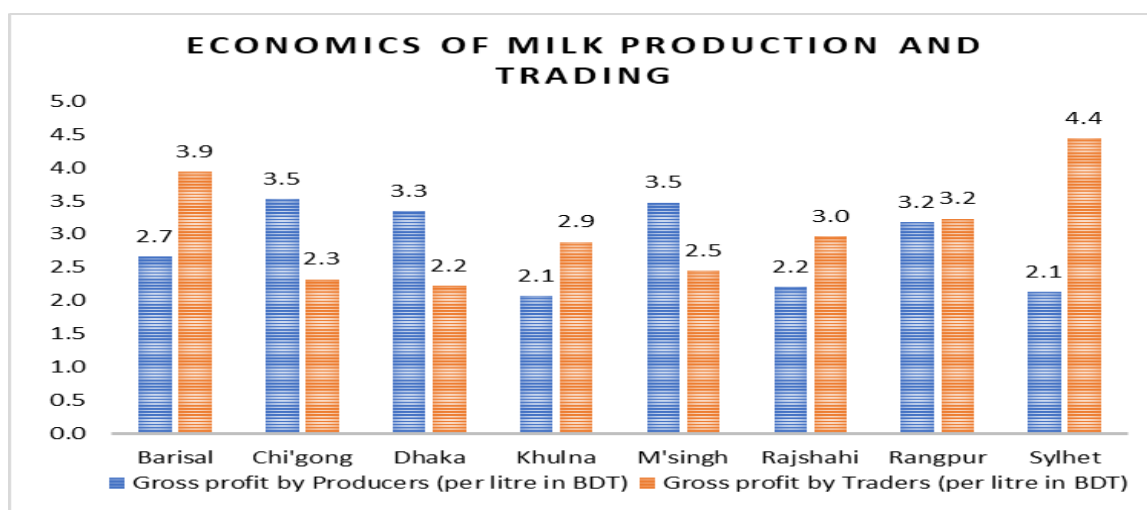


Figure 4: Economics of Milk Production and Trading

FGD was conducted with producers in Madaripur on 3rd August 2022 to gain additional insights. The findings of the FGD are summarized in Annex D2.

6.2 Beef Fattening

A large number of producers are involved in beef fattening just before 3 or 5 months of Eid-ul-Azha when demand for sacrifice animals is at the peak. Cattle fattening for beef production is undertaken on commercial scale, notably in Gazipur, Mymensingh, Sirajgonj, Rajshahi, and Pabna (Kamal et al. 2019, Sarma, et al. 2014).

Figure 5 shows the distribution of human and cattle population per square kilometer (Km²), availability of cattle in proportion to 1000 people (C:10 households (C: 103 HH), ratio of cattle number between Farm to Non-Farm holdings, and percent (%) distribution of total cattle among the different farm categories small⁶, medium, large and non-farm households) (Huque & Khan 2017). The density of human population per square kilo meter of Bangladesh in 2012 varied from 86.7 to 8229 with an

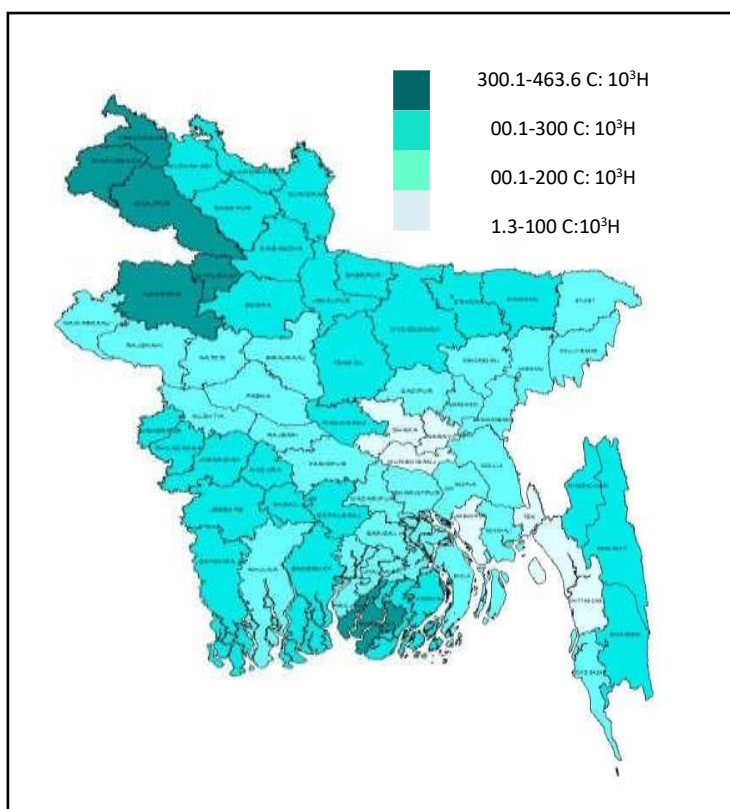


Figure 5: Cattle Production Zones (Huque & Khan, 2017)

⁶ The farm categories according to land ownership are i) small, ii) medium and iii) large category having 0.05 to 2.49 acres, 2.50 to 7.49 acres and operated land, respectively (BBS, 2010). The rest having no operated or cultivated or <0.05 acres of cultivated land are classified as non-farm households.

average number of 1124.0 ± 1057 , and the same for cattle was 19.7 to 361.7, and 188.5 ± 78.7 , respectively. The darkness of shades represent increase in density of cattle population.

Dhaka and Chittagong are the main destination markets of fattened cattle (Kok et al. 2021). Farmers use three years old cattle -preferably uncastrated males - for beef fattening and these achieve a maximum growth rate between 1.1 to 1.4 years of age. Cattle fattening period is 37 days to 116.74 months in rural areas of Bangladesh (Kok et al. 2021, p. 20).

Over 90% of the farmers select beef type cattle for fattening purpose (Islam et al. 2012). There is an overwhelming preference for cross breeds. Traditionally, rice straw, green grass, sugarcane tops, wheat and rice bran, molasses, pulse bran and locally available resources such as pumpkin, carrot, banana, vegetable by products, rice gruel, boiled rice bran, oil cakes etc. are used as feed for beef fattening. In a study in Mymensingh, Mahmud et al, 2019 found 59% of the producers applying steroids (dexavet, pednivet, oradexon, decason, paractin, gludex etc) as growth promoters in beef cattle fattening.

Most producers are unaware of the public health hazard caused by steroids. Training of producers, health awareness campaigns and strict enforcement is likely to significantly reduce the use of steroids in beef fattening.

In a study in three Upazilas in Dinajpur, Rahman et al. (2013) found that 56% of producers used their own capital for beef fattening, 24% took bank loans and the remaining producers lent from other sources. Short-term loans for beef fattening are available from major banks, PKSF, and MFIs in Bangladesh. Bangladesh Krishak Bank, IFIC Bank, Sonali Bank, Rupali Bank and many PKSF supported NGOs actively finance beef fattening activities (see Box 1).

Box 1: Rupali Bank Beef Fattening Scheme

Rupali Bank is owned by the Government of Bangladesh. The bank is active in developing green banking and financial inclusion policy. Rupali Bank also provides small-scale credit such as beef fattening loans, goat/sheep rearing loans, and backyard poultry loans, and dairy loans for socio-economic development of the country under the policy pursued by the Government. Further, under the refinance scheme of Bangladesh Bank, the Rupali Bank disbursed 17.59 crores for beef fattening, 3.11 crores for goat/sheep rearing, and 0.61 crores for poultry in the year 2020. For beef fattening, each borrower gets maximum 25,000 BDT for 5 calves (each 5,000 BDT). The loan is collateral free and the tenure of the loan is one year. The Bank also has a window under Bank-Linkage credit facility to support NGO efforts in promoting artificial insemination.

The small producers sell their fattened cattle to local traders as shown in Figure 6. There is a growing number of private ranches that specialize in growing foreign breeds for Eid ul Adha market. They link up with private abattoirs for slaughter, and supermarkets for marketing. Supermarkets cater to high end consumers offering convenience of shopping under one roof, guaranteed quality, and fixed price.

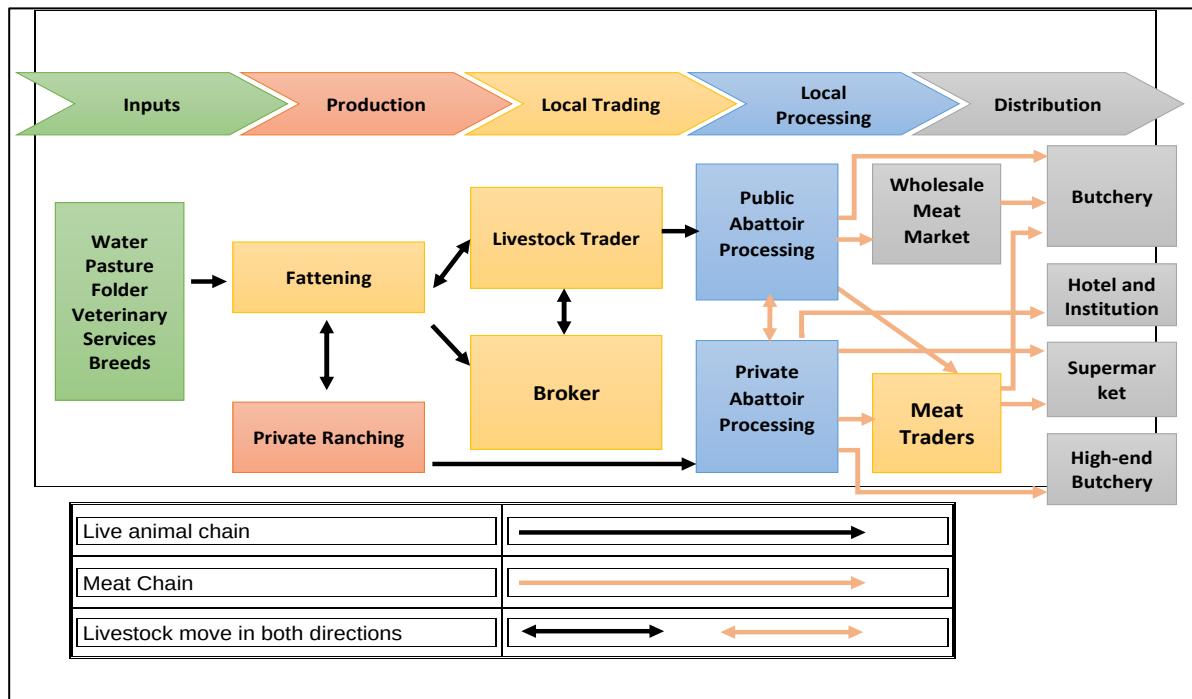


Figure 6: Beef Fattening Value Chain

As per our field observation, producers in beef fattening trade sold their products mainly to forward contracted customers (20%), walk in customers at the farmgate (20%), 20% to village 'haats', and balance 20% to local/village traders. The unit profit margin for fattened beef for farmers and village traders was calculated (see Table 11 below). The data was collected from 184 producers and 44 traders from all eight divisions.

Table 11: Value Addition by Producer and Village Trader in Beef Fattening (BDT)

A. Producers										
SL	Divisions	Barisal	Chi'gong	Dhaka	Khulna	Rajshahi	M'singh	Rangpur	Sylhet	Avg./Total
	Number of Districts covered	2	3	1	2	1	2	1	2	14
1	Age of bull purchased (months)- local/cross breed	26	19	21	20	24	20	22	23	22
2	Weight of bull (kg)	155	157	192	154	193	193	183	155	173
3	Purchase price of bull (BDT)	55,367	55,778	69,800	54,233	61,400	67,070	58,000	52,627	59,284
4	Purchase price of bull per kg (BDT)	356	356	364	351	319	347	317	340	344
5	Rearing time (in days)	111	182	173	161	132	153	171	145	153
6	Weight at time of sale (kg)	256	318	359	244	295	315	312	252	294
7	Sale price of bull (BDT)	95,340	118,556	137,000	96,688	95,000	117,706	101,000	89,715	106,376
8	Sale price per kg (BDT)	372	373	382	381	322	374	324	357	361
9	Feed cost (BDT)	9,371	26,431	27,700	6,233	15,200	21,658	17,500	16,077	17,521
10	Medicine cost (BDT)	1,915	1,765	1,920	803	600	1,483	800	1,043	1,291
11	Marketing cost and others (BDT)	577	610	1,540	496	1,800	828	1,800	470	1,015
12	Avg. loan amount (BDT)	0	14,667	20,000	36,500	50,000	4,605	50,000	12,833	23,576
13	Loan service cost (BDT)	0	1,189	2,500	1,820	3,620	455	4,510	388	1,810
14	Gross profit (BDT)	28,111	32,784	35,490	30,640	12,380	26,212	18,390	19,109	25,389
15	Gross profit as % of sale price	29%	28%	26%	32%	13%	22%	18%	21%	24%
16	No. of respondents (Farmers)	30	45	10	22	10	31	10	26	184

B. Traders										
	Divisions	Barisal	Chi'gong	Dhaka	Khulna	Rajshahi	M'singh	Rangpur	Sylhet	Avg./Total
	No. of districts covered	2	3	1	2	1	2	1	2	14
1	Purchase price of trader (BDT)	95,340	118,556	137,000	96,688	95,000	117,706	101,000	89,715	106,376
2	Marketing cost of trader (BDT)	2,771	1,873	6,333	2,115	1,150	3,583	1,800	1,330	20,956
3	Total cost of prior sale the animal	98,111	120,429	143,333	98,803	96,150	121,290	102,800	91,045	108,995
4	Trader's sales price (BDT)	106,900	128,467	149,833	106,340	102,160	130,358	106,700	96,500	927,258
5	Gross profit (BDT)	8,789	8,038	6,500	7,538	6,010	9,069	3,900	5,455	6,912
6	Gross profit as % of sale price	8%	6%	4%	7%	6%	7%	4%	6%	6%
7	No. of respondents (Traders)	7	5	6	5	5	6	5	5	44

The rearing time was in the range of 111 to 182 days. The average gross profit per animal for a producer is 26,389 BDT or 24% of the sale price. The trader's gross profit margin per animal is 6912 BDT which is 6% of the sale price. If producers are able to make direct online sale to the buyers, they would substantially add to their profits.

The Figure 7 below graphically depicts the gross profit of producers and traders for an individual fattened bull. There are considerable variations between beef prices across the divisions. This is partly explained by the difficulties in transportation and lack of real time

market information. To avoid of hassles of transportation, the producers like to sell their cattle in the local market.

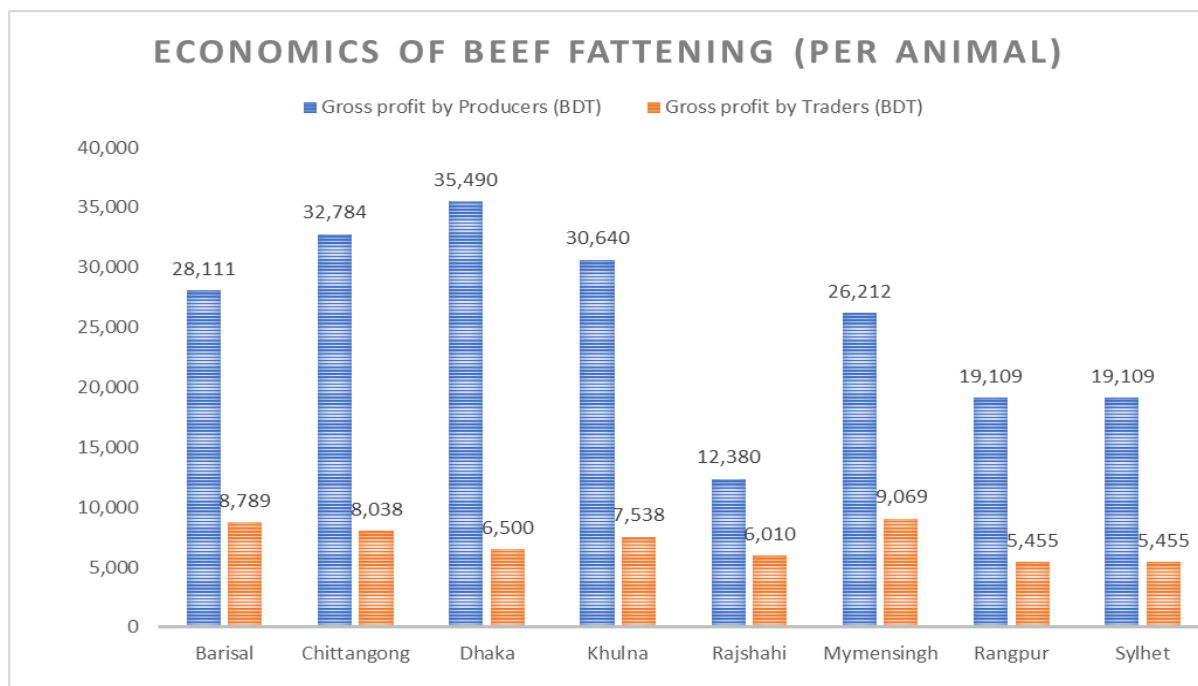


Figure 7: Economics of Beef Fattening (Per Animal)

FGD was conducted with producers on 2nd August 2022 in Gopalganj to gain additional insights. The findings of the FGD are summarized in Annex D3.

6.3 Small Ruminants

There are about 266.04 lakh goats and 36.79 lakh sheep in Bangladesh. In other words, for every sheep, there are seven goats. Black Bengal Goats comprise more than 90% of the total goat population; the remaining ones include the Jamunapari and their crosses.

Goats

More than 90% of the goats in Bangladesh are kept by rural people. The goat ranks second in position in terms of meat, milk, and skin production, representing about 28, 23, and 28 percent respectively of the total production of those commodities in Bangladesh (Huque & Khan, 2017).

Both sexes have horns (5.8-11.5 cm), directed upward or sometimes backward. Beards are often observed in both sexes. The average height of an adult is 50 cm. The body being small, an adult buck's weight ranges from 16-18 kg and that of a doe, 12-14 kg.

Goat is important for its adaptability, fertility, prolificacy, delicious meat, and skin softness. The breed is early maturing with first kidding occurring at about 12 months. Does kid twice a year or thrice in two years. They have the potential for better fertility and litter size. Chevron (goat meat) is famous for tenderness, flavour, and leanness. Their skin is of superior quality for leather goods and is of great demand both in domestic and foreign markets. Black Bengal Goats are much more adaptive to our harsh environmental conditions and fluctuating supply of nutrients. Grazing on fallow lands, bunds, roadsides and embankment are the only means of feeding the animals. They are best users of grasses, shrubs and various tree leaves, which have little alternative use. They can be reared easily without or with a little amount of supplement feed such as wheat bran, rice polish, mustard cake, molasses etc. In Bangladesh most goats are kept by women and children; consequently, the production cost is minimum. Very few goat farmers receive any training.

The Black Bengal goat breed is found right throughout Bangladesh. There is a significant concentration of Black Bengal goats in six districts, namely Lalmonirhat and Rangpur in the North), Tangail and Mymensingh in Central part and Khulna, and Meherpur in Southern part of Bangladesh (see Figure 8)

As per Huque & Khan (2017), the country has 12.4 to 359 goats of 126.5/Km² on a similar plane of the distribution of human population. The number of goats 1000 people (G:H103) in different districts ranged from 8.9 to 412, with an average number was 138.6 G:H103, and the variation per 1000 households (G: HH103) 3439 with an average of 698 goats. Compared to cattle, non-farm households keep a higher percent of goat (24.4% of the total).

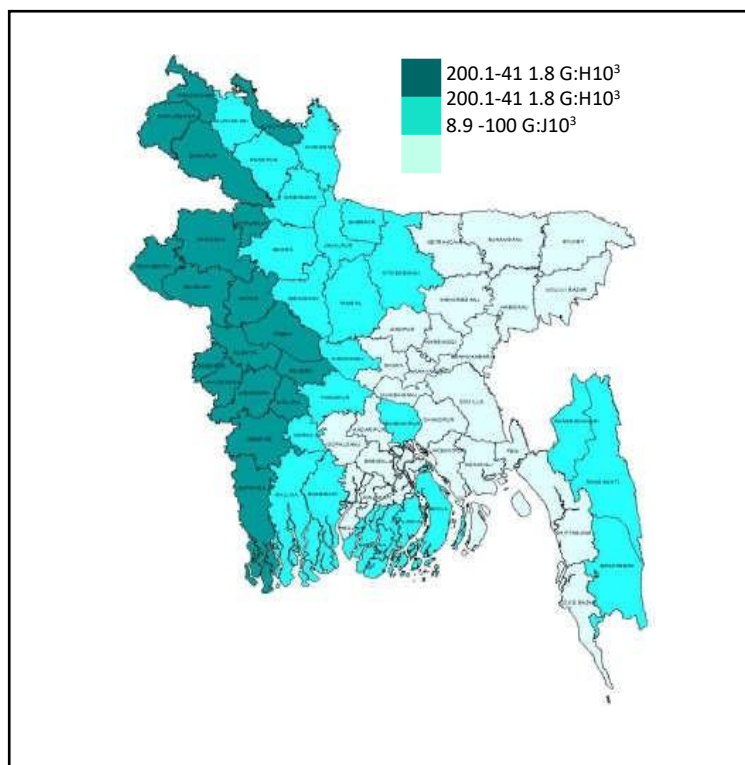


Figure 8: Goat Production Zone (Huque & Khan, 2017)

The information gathered during the study enabled the longitudinal mapping of the goat value chain as presented in Figure 9 where the value chain map illustrates the way in which live goat and sheep flow from farm gate to end markets and how the overall small ruminant segment operates. It is a visual representation of the structure of the value chain. The product and/or service flows between nodes are represented by arrows; for example, from production to wholesaling, from wholesaling to retail or export, or from primary wholesaling. The movement of a live animal or products implies that value is added to the product. The end market segments are placed at the top of the diagram and represented by ellipses.

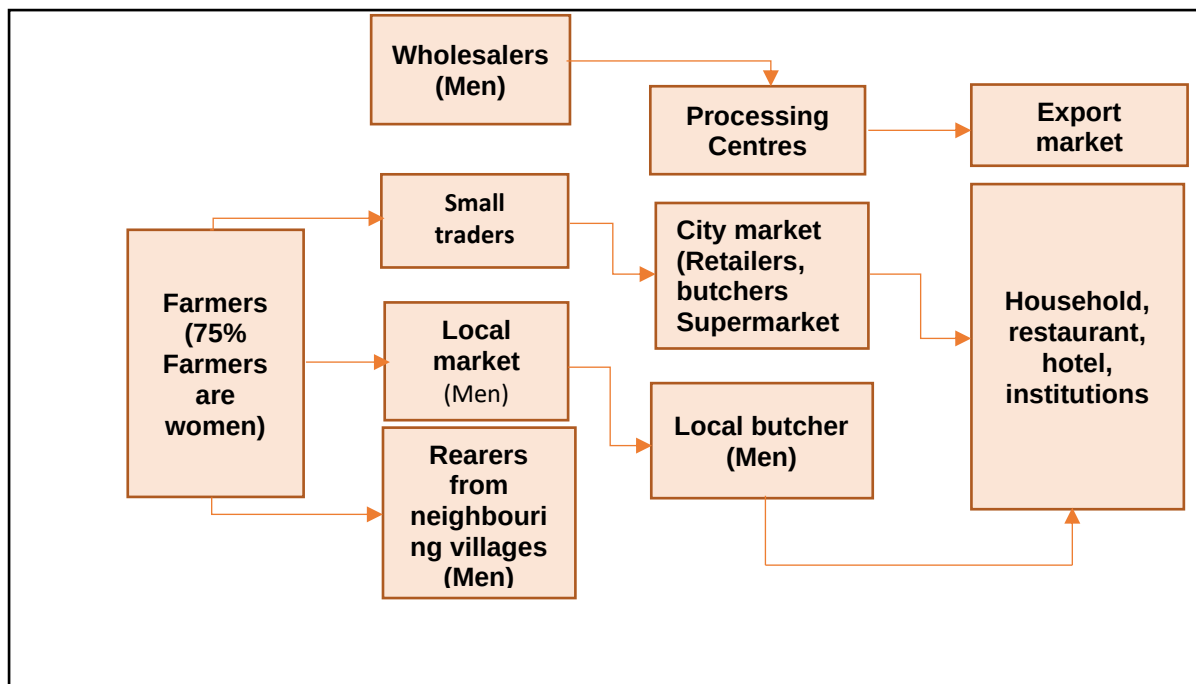


Figure 9: Goat and Sheep Value Chain

Since non-descriptors are the main category of ruminants traded, the unit cost and profit margin of only these varieties have been calculated. As per our field observation, producers in goat trade sell their products mainly to village traders (50%), 30% in village 'haats', and balance 20% to walk in customers at the farm gate.

165 producers and 66 traders were surveyed in 13 districts of located in Barisal, Chittagong, Dhaka, Khulna, Mymensingh and Sylhet division (see Table 12 below).

Table 12: Value Addition by Producer and Trader in Goats (BDT)

A. Producers								
Sl.	Divisions	Barisal	Chi'gong	Dhaka	Khulna	M'singh	Sylhet	Avg./Total
	No. of districts covered	2	3	2	4	1	1	13
1	Purchase price of an adult doe (BDT)	10,033	9,837	8,900	9,708	8,567	8,400	9,241
2	No. of kids born during last one year	4	3	3	3	4	3	3
3	# of goat sold during last year	3	2	2	2	2	1	2
4	Sale price of goats (BDT)	13,469	10,900	9,575	12,154	11,867	6,500	10,744
5	Value of present stock (BDT) (Doe plus not sold offspring)	16,225	14,713	12,850	15,463	16,200	13,850	14,883
6	Feed cost during last one year (BDT)	1,818	2,493	2,010	2,718	1,517	1,450	2,001
7	Medicine and Vaccine cost during last one year (BDT)	351	1,056	715	462	1,130	380	682
8	Marketing cost and other costs (BDT)	1,029	781	300	610	500	500	620
9	Total cost for one year (BDT)	13,232	14,168	11,925	13,498	11,713	10,730	12,544
10	Net profit/loss (BDT)	238	(3,268)	(2,350)	(1,343)	153	(4,230)	(1,800)
11	Net accrual value of adult goat and offsprings goat in one year (BDT)	29,694	25,613	22,425	27,617	28,067	20,350	25,628
12	Gross Profit/loss+ net accrual (BDT)	29,931	22,345	20,075	26,273	28,220	16,120	23,828
13	Gross profit + Net accrual value as % of sales price	222%	205%	210%	216%	238%	248%	223%
14	Number of respondents	34	41	20	45	15	10	165
B. Traders								
	Divisions	Barisal	Chi'gong	Dhaka	Khulna	M'singh	Sylhet	Avg./Total
	No. of districts covered	2	3	2	4	1	1	13
1	Purchase price of goats (BDT)	13,469	10,900	9,575	12,154	11,867	6,500	10,744
2	Marketing cost (BDT)	479	687	450	348	580	320	477
3	Sales price (BDT)	15,368	13,207	11,240	13,770	13,650	7,740	12,496
4	Gross profit (BDT)	1,420	1,620	1,215	1,268	1,203	920	1,275
5	Gross profit as % of sale price	9%	12%	11%	9%	9%	12%	10%
6	No. of respondents	11	15	10	20	5	5	66

The farmer buys a doe, and receives on an average 3 kids in 6-8 months' time. Of the 3 kids, 2 are sold for cash. For a year-long effort, the average cash profit for a farmer is -1800 BDT from one goat. The farmer main gain is from the offspring that are born during the year which are reared for subsequent sale. The net accrual value of adult goat and unsold off-springs is 23,828 BDT. This translates into an average gain of 223% on the sale price. The trader's average gross profit from the sale 2 goats is an average is 1275 BDT.

The Figure 10 below illustrates the gross cash profit and accrued value of producers and traders from rearing one goat for a year.

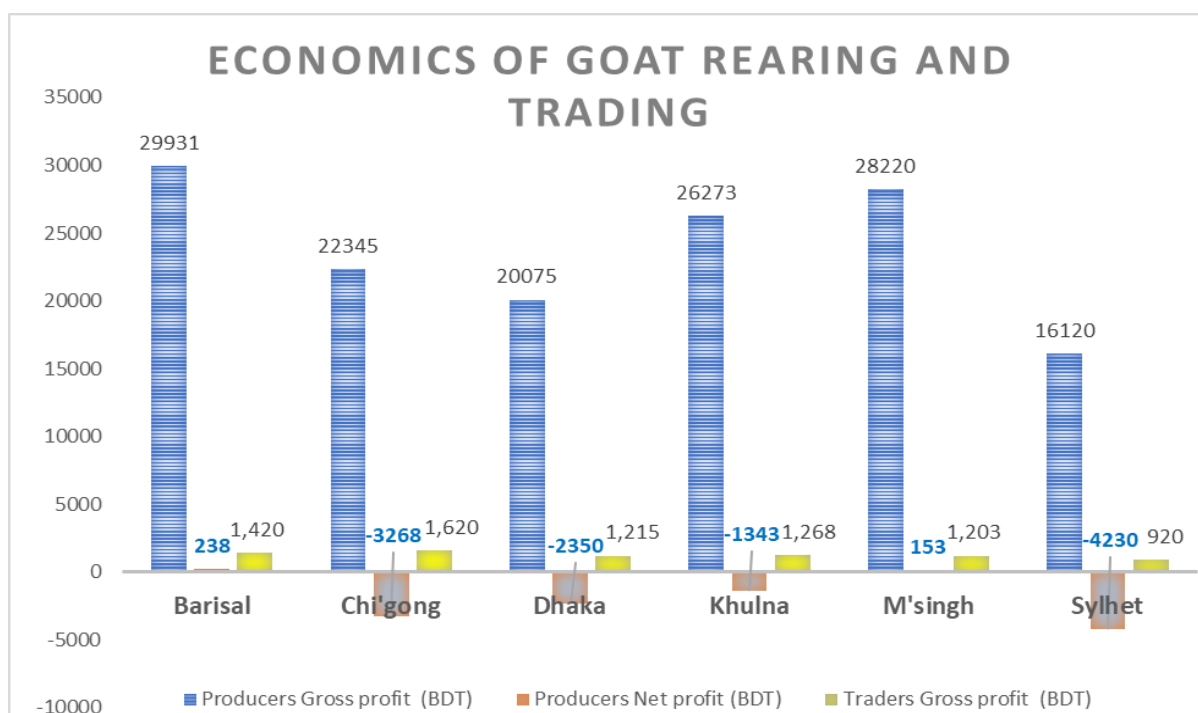


Figure 10: Economics of Goat Rearing and Trading

To gain additional insights FGD was conducted on 22nd June 2022 with 10 women producers in Meherpur district in Khulna division. The findings of the FGD are summarized in Annex D4.

Box 2: Parul Rani and goats push back poverty

Parul Rani (35) of Bishnupur village, Taraganj Upazila, Rangpur district is a local celebrity. Goaded (???) by DLS ULO, she started with 3 goats in 2012. It was essential to do so because her income from daily casual work needed supplementation. Over the years, DLS has provided veterinary medicine, vaccine and general technical advice. She has raised and sold over 155 goats in the last eight years and earned more than 10 lakhs in income. With the help of Afzalul Haque, Chairman, Kursa Union Parishad, and DLS ULO Dr. Farhad Noman, she has organized more than 200 women into a goat producer group to raise, rear, and sell goats. The members feel if Parul can fight back poverty, so can they. All the more now because they have a living model to follow and draw inspiration every day.

Sheep

Sheep is a promising source of meat and wool of Bangladesh. Bangladesh possesses 3.40 million sheep and most of them are indigenous type. The indigenous sheep population of Bangladesh are Barind (Naogaon, Rajshahi, Chapi Nababganj), Jamuna River basin mostly in Tangail), Coastal (Noakhali) and Garole sheep (Satkhira, Khulna, Chandpai, and Sarankhola). Chotanappuri sheep breed, originally from India, are found in Meherpur and Chapai nawabganj district and its adjacent regions of Bangladesh (see Figure 11).

According to Huque & Khan (2017), on an average there are 8.80 sheep/Km². The number of sheep per 1000 people (S:103 H) found to range from 1.4 to 46.6 with an average of 9.10, or per 1000 households (S:103 HH) was 2.3 to 246.6 with an average of 50.5 sheep. Similar to goat, non-Farm households keep 24.2% of the total sheep. The dark areas show concentration of sheep population which is north Bengal.

The sheep population is sparsely distributed throughout country with a comparatively higher concentration in coastal regions, barind tracts, north-eastern wetlands, Sundarban-delta regions and Jamuna River basin areas (Deb et al. 2019).

A door-to-door survey of 39 producers was done by LSPs in 4 Upazilas of Noakhali district in 2022. The unit profit margin for sheep farmers and village traders was calculated (see Table 13 below). Since most of fodder is available from open grazing in “Baithan” and home-grown grass and rice straw, the cost of fodder is quite low.

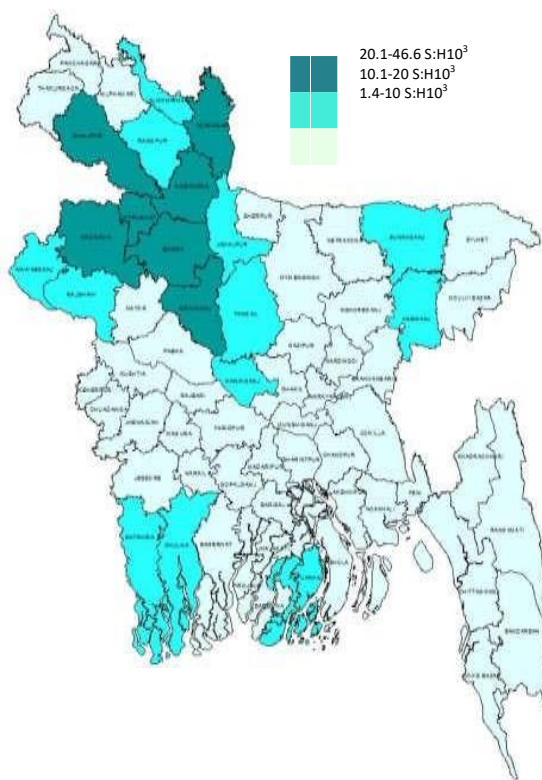


Figure 11: Sheep Production Area (Huque & Khan, 2017)

Table 13: Value Addition by Producer and Trader in Sheep (BDT)

A. Producers		
Sl.	Particulars	Amount in BDT
1	Average purchase price of an adult ewe	7,215
2	Average cost of maintenance (food, fodder and other incidental charges)	4,885
3	Total cost (1 + 2)	12,100
4	No. of kids born	3
5	No. of kids sold	2
6	Sale of kids	9,392
7	Net Profit/Loss	-2,708
8	Net accrual value of adult goat and offsprings goat in one year (BDT)	11,912
9	Gross Profit/loss+ net accrual (BDT)	9,204
10	Gross Profit/loss + accrued value (BDT) as % of sales price	98%
11	No. of respondents	39
B. Traders		
Sl.	Particulars	Amount in BDT
1	Purchase price of trader	9,392
2	Incidental cost of trader	240
3	Total expenses of trader	9632
4	Trader's sales price	10639
5	Trader's Gross profit	1007
6	Gross profit margin (GP/Sales) in %	10%
7	No. of respondents	22

For a year-long effort, the average benefit per animal for a producer is 9370 BDT. The gross profit margin for producer is 106%. The main benefit to the producer comes from the increase in accrued value of the ewe and unsold lamb at the end of the year, which is valued at 9923 BDT. The village trader's profit is placed at 2513 BDT and gross profit margin is 29%.

Figure 12 below illustrates the economics of sheep production and trading.

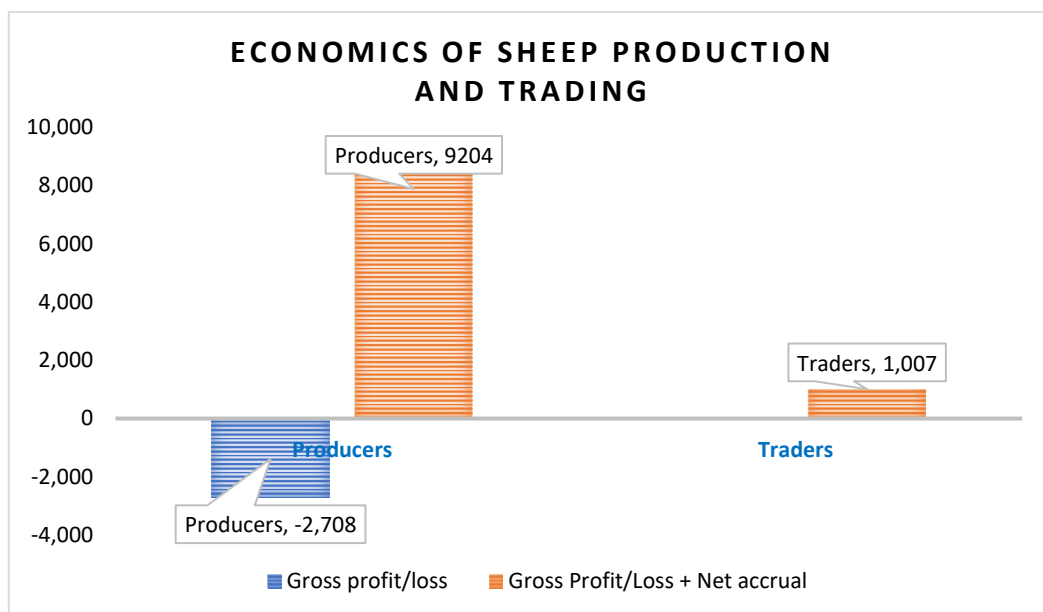


Figure 12: Economics of Sheep Production and Trading

One FGD was conducted with producers on 27 June 2022 in Companiganj Noakhali to gain additional insights. The findings of the FGD are summarized in Annex D5.

6.4 Backyard Poultry

As part of their anti-poverty and food security programs, backyard poultry is promoted by NGOs, donors and development finance institutions. DLS, and community animal health workers trained by NGOs are the main source of veterinary care and medicine (see Figure 13).

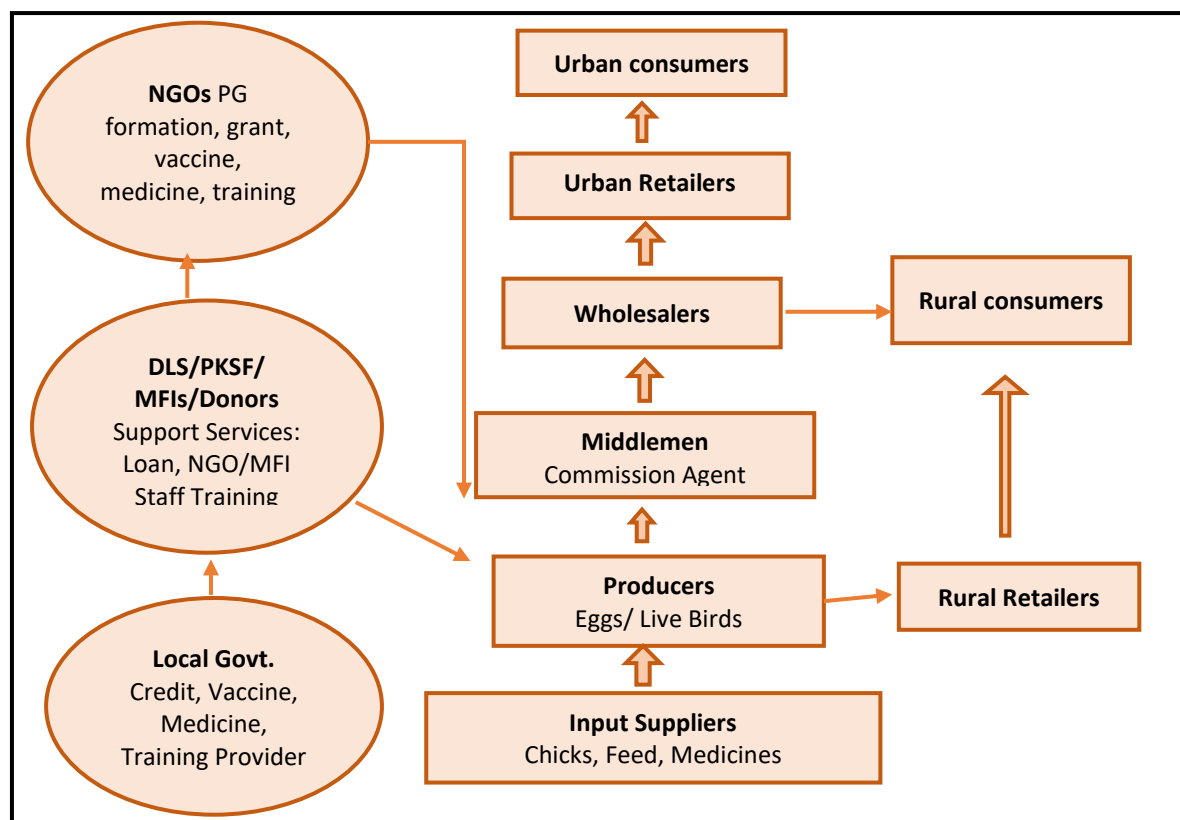


Figure 13: Backyard Poultry Value Chain

Backyard chicken

It is estimated that there are about 304 million chickens and 61.7 million ducks in the total poultry population (DLS 2021). The CAGR of chicken and duck population between 2011-12 and 2020-21 was 2.27% and 3.06% respectively. Both indigenous chickens and ducks have the advantage of being well adapted to the local environmental conditions (hot humid dry and rainy weather). They are scavengers by nature and a system of concentrate feeding is not cost effective. The birds scavenge for their own feed from morning to evening around houses, fields and water bodies. The chicken depends on field grains insects, earthworms, green matters crop residues homestead pickings and kitchen wastes. During monsoon months (June to mid-October), chicken is kept indoors and fed locally feed rich in calcium, protein and minerals. Chicken is found everywhere in Bangladesh. Naugaon, Nababganj, Rajsahi in the North, Patuakhali, Barguna, Pirojpur, Jhalokati, and Bagerhat in the South, and Chittagong Hill Tracts are the main production centres of chicken (see Figure 14).

According to Huque and Khan (2017), Bangladesh has 105 to 1212 chickens/Km an average number of 722. On the same population distribution (86.7 to 8229/ average 802 chicken were available for each 1000 people (Ch:H103) with a range of 72.8 to 1875. The range of chicken per 1000 households (Ch:103 HH) varied from 776 to 16664 with an average number 4499. Little over half of the households (55.0% of the total) rear chicken. The small, medium, large and non-farm households owned 57.7%, 15.5%, 2.30% and 24.5% of the total chicken. The darkly shaded area shows that there is greater concentration of chicken in North Bengal, Chittagong hill tracts, and South Bengal.

The village chicken is a low producer because of poor genetic makeup and inadequate nutrition and management. In spite of this backyard chicken farming

is a highly cost-effective enterprise because the inputs required to sustain the system are small. No cost is incurred by the producers' stocks and feeds are internally generated and health care is expected to be provided free by the government. In recent years, due promotion by DLS and NGOs and superior performance of Sonali breed has become a common place in urban markets. According to Netherlands Enterprise Agency (2020, pp. 20), there are 175-200 million Sonali chicken are raised in semi-intensive conditions with flock size between 300-500 birds (see Table 14 for a comparison of performance of different chicken breeds in Bangladesh).

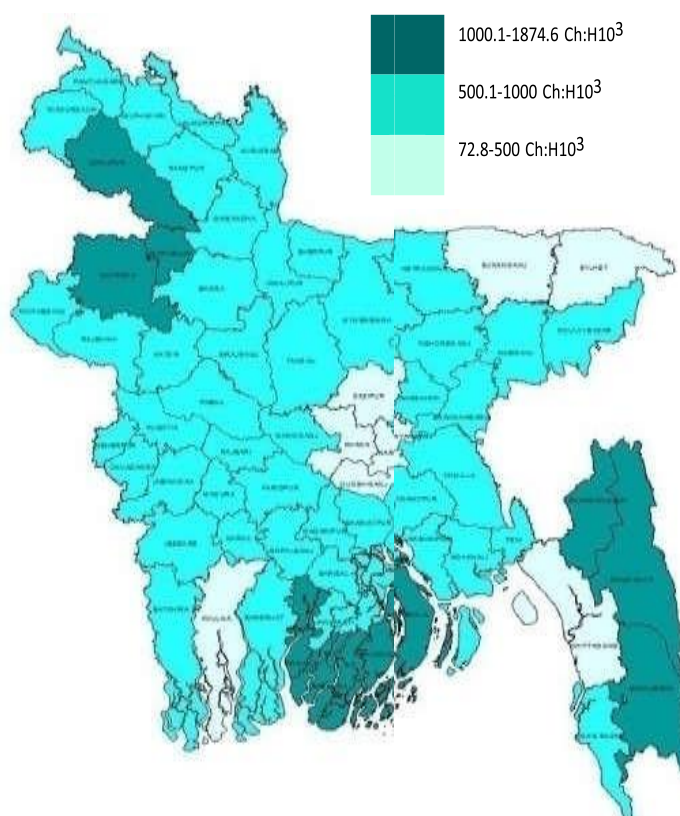


Figure 14: Chicken Production Zone (Huque & Khan, 2017)

Table 14: Comparison of Performance of Indigenous Chickens with that of Sonali

Trait	Indigenous Chicken				Hybrid
	Desi Non-descript	Naked Neck	Fayoumi	Aseel	Sonali Semi Scavenging
Age at first egg (days)	175	234	133-140	147-154	173
Mature body weight (kg)	1 - 1.3	1.17	1.8	1.7- 4.50	1.6
Egg weight	35.8		45-50	45-50	45.4
Egg production/hen/year (no.)	45	50-55	230-240	100-120	156
Mortality (%) (up to 500 days)	9.0	8.33			5.7

Source: Data for Desi, Naked Neck and Aseel quoted in Bhuiyan et. al. 2005; and Sonali from FAO (2015). Faoyoumi from Jahan et. Al 2015.

Bangladesh has innovated a semi-scavenging poultry model using Sonali hybrid chicken. The Sonali chicken is a cross-breed of Rhode Island Red (RIR) cocks and Fayoumi hens. The Sonali chicks are reared in confinement during the first 8 weeks of age in the chick rearing unit after which they scavenge part-time for some days in the smallholder farmer's yard and are gradually shifted to the existing scavenging system. Sonali is among the top exotic breed combinations with highest egg production (156 eggs/hen/ year), lowest mortality and highest profit per hen (FAO 2015). The DLS have been maintaining RIR and Fayoumi breeds in their farms and producing Sonali chicks for rural smallholder producers.

The women in the community are mainly involved in poultry keeping as a means of deriving food and extra income. Chicken rearing is culturally acceptable and technically and economically viable. Moreover, the ownership of chickens is entirely in the hands of women. Ninety percent producers keep their chickens and ducks in earthen houses. One fourth of the backyard poultry keep their birds inside the owner's bed room. In most of the mud houses space and ventilation system are not adequate. Inside the houses some bedding materials (litter) such as ash and sand are used. These materials are easily available to the producers and cost nothing. The owner does not or cannot clean the houses every day but about once in 15 days cleaning takes place and is normally done by women. The chickens sometime lay eggs outside the chicken houses e.g., in store room or similar quiet places. The eggs are naturally incubated under broody hens and ducks.

In the scavenging chicken production system disease is the main constraint. About 30% of poultry birds die every year in Bangladesh due to outbreaks of several infectious diseases (Al Mamun et al 2019). Newcastle disease and bursal disease are economically important infectious disease for indigenous and commercial poultry. Among bacterial diseases, salmonellosis in poultry shows more than 10% mortality and reduces egg production and hatchability for up to 20–30% (Mamun et al 2019). Among two seasons, most of the outbreak of diseases was found in summer followed by rainy season. Government vaccination programs often do not reach the rural villages mainly due to insufficient veterinary extension services and shortage of vaccines.

Despite rapid acceptance of broiler chicken in the market, almost all small holders in rural areas do rear dual purpose indigenous chickens in the backyard. Indigenous chickens constitute nearly 70% of the total chicken population of the country (DLS 1998). Currently, about 70-80% of the rural livestock-holders' rear chickens and the average number per household is 5-6. The indigenous chicken population is composed of a number of breeds/types such as nondescript Desi Aseel, Naked Neck and Hilly. The non-descript Desi chicken is more acceptable to rural people as an important source of meat and eggs (Barua and Howlader 1990) due to lower nutritional demand and higher resistance to diseases and heat stress. These rural Desi chickens provide about 78% of poultry meat and 75% of eggs for domestic consumption.

Data from 215 producers and 72 traders were collected in 2022 from 14 districts in 7 divisions. The unit profit margin for Desi chicken farmers and village traders was calculated (see Table 15 below).

Table 15: Value Addition by Backyard Desi Chicken Producers and Traders (BDT)

Sl.	Division	Barisal	Dhaka	Chi'gong	Khulna	M'ingh	Rangpur	Sylhet	Avg./Total
	No. of Districts	2	2	3	2	1	3	1	14
	A. Producers								
1	Purchase price of DOC (Tk)	13.9	14.1	14.2	14.1	14.1	14.3	14.2	14.1
2	Rearing time (in week)	13	12	14	14	14	13	13	13
3	Eggs produced in 52 weeks	45	47	44	46	46	47	45	46
4	Eggs consumed at home (20% of production)	11	12	11	11	11	12	11	11
5	Sale of eggs (25% of prodn.)	11	12	11	11	11	12	11	11
6	Price of egg	12	12	13	13	12	12	13	12
7	Sale of eggs (BDT)	135	145	143	143	137	139	146	141
8	No. of chicks brooded (55% of eggs, 30% mortality)	16	16	16	16	16	16	16	16
9	No. of chicken consumed at home (25%)	4	5	4	5	4	5	4	4
10	No. of chicken for sale	12	11	12	12	12	11	12	12
11	Sale price of 13 week chicken (in Tk)	406	403	408	401	403	404	395	403
12	Sale of 13 week chicken (Tk)	4787	4574	4717	4626	4832	4593	4636	4681
13	Medicine cost (Tk)	194	200	136	240	258	192	189	201
14	Gross profit from egg and chicken (Tk)	4714	4504	4709	4515	4697	4525	4579	4606
15	Gross profit margin (GP/Sales) in %	98%	98%	100%	97%	97%	98%	99%	98%
16	No. of respondents	30	30	35	30	30	30	30	215
	B. Traders								
1	Eggs purchased (BDT)	135	145	143	143	137	139	146	141
2	Chicken purchased (BDT)	4787	4574	4717	4626	4832	4593	4636	4681
3	Marketing cost (BDT)	10	10	10	10	10	10	10	10
4	Sale price of egg (BDT)	14	14	14	14	14	14	14	14
5	Sale price of chicken (BDT)	428	426	427	427	427	427	423	426
6	Sale of eggs (BDT)	159	164	155	162	160	168	158	161
7	Sale of chicken (BDT)	5038	4832	4928	4931	5117	4847	4970	4952
8	Gross Profit from eggs and chicken (Tk)	264	267	214	314	298	273	335	281
9	Gross profit margin (GP/Sales) in %	5%	5%	4%	6%	6%	5%	7%	5%
10	No. of respondents	10	10	9	13	10	10	10	72

It is assumed that all producers buy DOC, the chicks start laying after 23 weeks. 20% of eggs are self-consumed, 25% sold in the market, and 55% kept for brooding. Following Al Mamun (2019), the mortality rate of brooded chicks is taken as 30%. For a year-long effort, the average profit per bird for a farmer maintaining 12 birds is 4606 BDT. The village trader's profit from selling eggs and bird is 281 BDT. The gross profit margin of producer is 98% and for trader 5%. The reason why the gross profit margin of producer is high is free availability of natural feed and unpriced family labor. The trader looks for quick rotation of his inventory and earns through volume trade.

A graphical presentation of earning of producers and traders of Desi chicken is given below (see Figure 15).

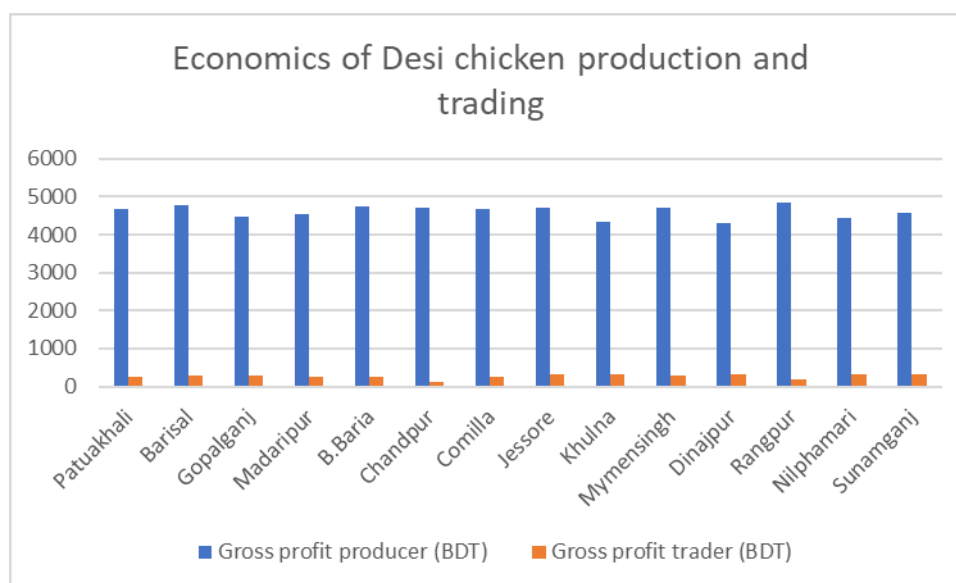


Figure 15: Economics of Desi Chicken Production and Trading

Further, FGD of backyard chicken producers was conducted on 28 June 2022 Noakhali Sadar Upazila (see Annex D6 for a report).

Ducks

The natural diet for ducks includes snails, earth worms, fish, algae, frogs, and shellfish which is plentiful March-November. During the winter months of December to February, water beds dry up and thereby the natural feeds are scarce for the ducks during foraging. The ducks experience shortage of protein and hence the egg production drastically drops. For getting production during this period, progressive producers provide layer feed daily two times in the morning, a mixture of paddy, rice polish, wheat bran and dried fish in the ratio of 50:15:10:25 parts.

Dinajpur, Jaipurhat, and Naogaon in the North, Bhola, Noakhali, Patuakhali, Barguna, Pirojpur, Jhalokati, and Bagerhat in the South are the main production areas of ducks (see Figure 16).

According to Huque & Khan (2017), the number of ducks varied from 6 to 746/Km with an average number of 287/Km range of human population. The ratio of ducks per 1000 people varied from 24 to 829 with an average of 306 in the country, while the ratio per 1000 households varied from 53 to 9242 with an average of 1910. On an average 28.9% of the households keep ducks. The small, medium and large farm owners keep 3.86 times than that of the non-Farm household.

Haor⁷ areas and wetlands around rivers are particularly suitable for duck raising. Geographically, most of the haors are situated in seven districts of the North-East Bangladesh. The districts are: Sunamganj, Kishoreganj, Netrokona, Sylhet, Hobiganj, Maulavi bazar and B. Baria. There are as many as 423 small or large haors in Bangladesh. The total area of haor-type wetland ecosystem is 80,000 sq. km² i.e., approximately 54% of total area of Bangladesh.

⁷ The low-lying vast depressions to the north eastern part of Bangladesh are called the 'haor's. These are found mainly in greater Sylhet and greater Mymensingh regions.

The native duck population is comprised of a number of breeds/types such as Indigenous Non-descript, Desi White, Desi Black, Nageshwari, Sylhet, Mete, etc. In respect of the morphological variations as well as production performances, Hamid, (2020) reports that the Khaki Campbell, Indian Runner, Muscovy and Jinding are the exotic ducks which are used most widely at a farm level. Cross breeds BLRI-1, BLRI 2 and the White Pekin, Cherry Valley and Thailand Black are limited in some duck farms and in-situ and ex-situ in-vivo stations of DLS, BLRI, and BAU in the public sector.

The Khaki Campbell and Jinding are to be considered as valuable duck genetic resources in the country. The ducks are more resistant to diseases than chickens and lay larger and more nutritious eggs (Baéza & Huang, 2022)). Rural families raise ducks for slaughter during festivities and sell their meat and egg. However, duck meat and egg fetch lower price than chickens. The indigenous chicken and duck population of Bangladesh has been undergoing genetic erosion since the 1960s due to continuous introduction of exotic stock and their indiscriminate crossing with the indigenous chickens (Hamid, 2020; and Bhuiyan et al. 2005). There does not seem to be sufficient awareness to improve and conserve these valued genetic resources.

As per our field observation, indigenous chicken producers sold their products mainly to walk in consumers at the farmgate (47 percent), another 20% in village 'haats', and balance 33% to traders. The traders particularly buy eggs for supply to urban markets where there is a growing demand for free range eggs.

The cost and profit margin for backyard duck farmers and village traders was calculated based on interview of 69 producers and 32 traders in Dinajpur, and Nilphamari in Rangpur division, Noakhali in Chittagong division and Netrakona in Mymensingh division (see Table 16 below). It is assumed that the producers buy 10-week-old ducklings. 10% of the eggs produced are self-consumed, 10% kept for brooding and 80% sold in the market. The overall mortality rate of ducks was assumed to be 26.2% on small holdings (Hoque et al 2011, p. 335).

For a year-long effort, the profit for producer from sale of 111 eggs and 8 ducks is 3530 BDT, while that of the village trader is 198 BDT. The gross profit margin as a % of sales price of producer is 98% and trader 5%/ The gross profit margin for producer is high due to naturally available feed and unpriced family labor. The producers incur some cost in feeding concentrate during lean winter months.

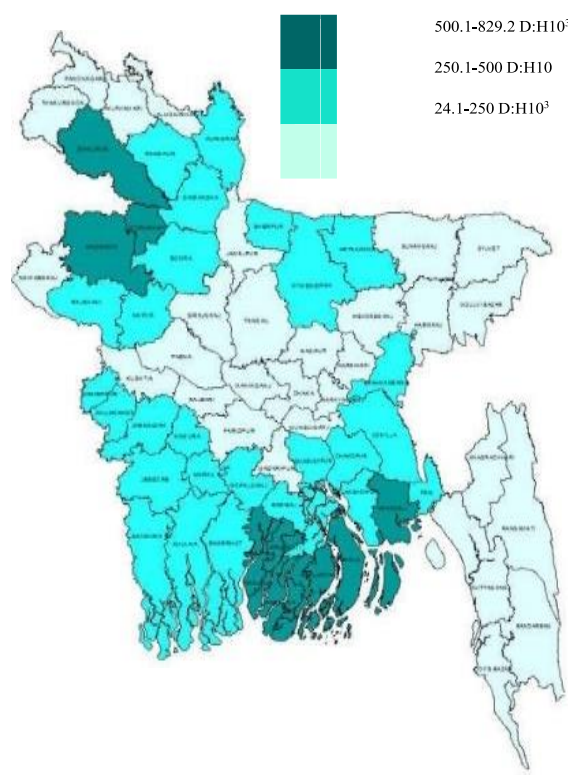


Figure 16: Duck Production Zone (Huque & Khan, 2017)

Table 16: Value Addition by Backyard Duck Producers and Traders (BDT)

Sl.	Division	Rangpur	Chittagong	M'singh	Avg./Total
	No. of districts	2	1	1	4
	A. Producers				
1	Purchase price of ducks (BDT)	32	33	36	34
2	Rearing time upto laying eggs (in wk)	25	22	19	22
3	Eggs produced in 52 weeks	139	141	137	139
4	No. of eggs for self consumption (10%)	14	14	14	14
5	No. of eggs for brooding (10%)	14	14	14	14
6	No. of eggs for sale (80%)	111	112	109	111
7	Value of self consumption (10%) (Tk)	146	148	148	148
8	No. of ducklings brooded (26.2% mortality)	10	10	10	10
9	No. of ducks consumed at home (20%)	2	2	2	2
10	No. of 18 weeks ducks sold	8	8	8	8
11	Price of egg (Tk)	10.53	11	11	11
12	Sale of eggs (Tk)	1,168	1,187	1,187	1,181
13	Sale price of 18 week duck	335	347	340	341
14	Sale of 18 week ducks (Tk)	2,684	2,777	2,722	2,728
15	Feed consumed Tk)	349	344	108	267
16	Medicine cost (Tk)	134	54	11	66
17	Marketing cost	15	16	5	12
18	Gross profit (Tk)	3,324	3,517	3,749	3,530
19	Gross profit margin (GP/Sales) in %	86%	89%	96%	90%
20	No. of respondents	28	21	20	69
	B. Trader				
1	Purchase of eggs (Tk)	1,168	1,187	1,181	1,179
2	Purchase of ducks (Tk)	2,684	2,777	2,728	2,729
3	Marketing cost of village traders (Tk)	20	21	21	20
4	Sale price single egg (Tk)	11.20	11	12	11
5	Sale price of single duck (Tk)	354	354	356	355
6	Sale of eggs	1,242	1,253	1,258	1,251
7	Sale of ducks	2,833	2,835	2,850	2,839
8	Gross Profit on eggs and ducks	204	213	178	198
9	Gross profit margin (GP/Sales) in %	5%	5%	4%	5%
10	No. of respondents	8	14	10	32

An FGD was conducted on 3rd July 2022 with producers and traders in Kishoreganj to gain additional insights. The findings of the FGD are summarized in Annex D7.

Figure 17 below illustrates the gross earning of producers and traders in the three districts surveyed.

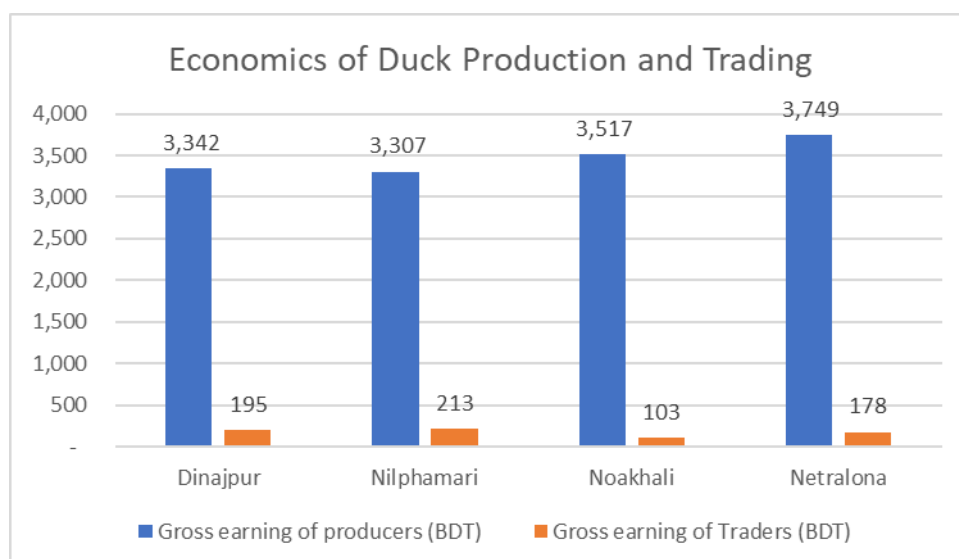


Figure 17: Chicken Production Zone (Huque & Khan, 2017)

Findings

The practical implications of the analysis of four value chains are that though there is considerable opportunity for growth and transformation of the livestock and dairy sector, there are significant challenges. The viability of small ruminants and backyard poultry depends on the health of natural habitat on which these animals' free range. Any deterioration of the habitat due to pollution, climate change, over grazing, or enclosures for private farming will have an impact on the availability of free feed for goats and poultry.

The dairy on the other hand is largely stall fed, and dependent on straw, concentrates and natural/cultivated grasses. The producers were also moderately satisfied with the extension services rendered by LDDP. Lack of timely vaccination of animals was a source of considerable consternation. They identified housing of animals and rising feed cost as two major constraints from expanding their current level of activities.

During the FGDs, the producer groups revealed that they were facing problem in marketing milk and also, they were not at all happy with the milk price. However, they did not face problems in terms of marketing fattening animals especially during Eidul Adha festival and the price was comfortable. In case of small ruminants and poultry, they did not have complaints about marketing and price. The producers and traders are aware of the value addition that takes place at different stages of milk processing (see Figure 18 below).

Though the producers would be interested to capture some of the revenues from value addition, they are constrained by lack of organization and ability to invest in such businesses. There is also considerable room for value addition by encouraging small and large entrepreneurs to process milk and convert them into milk products. The easy to execute opportunity lies in production of yogurt, fermented milk, sweetmeats, and cheese. The Government may look for strong private sector alliances along with public-private ventures to usher transformation of the sector. Mainstreaming the small producers into the formal economy will require strengthening the weak financial structure, reducing power imbalances in the governance structures and reduction in political intervention in community-level organizations, and resolving socio- cultural and environmental concerns.

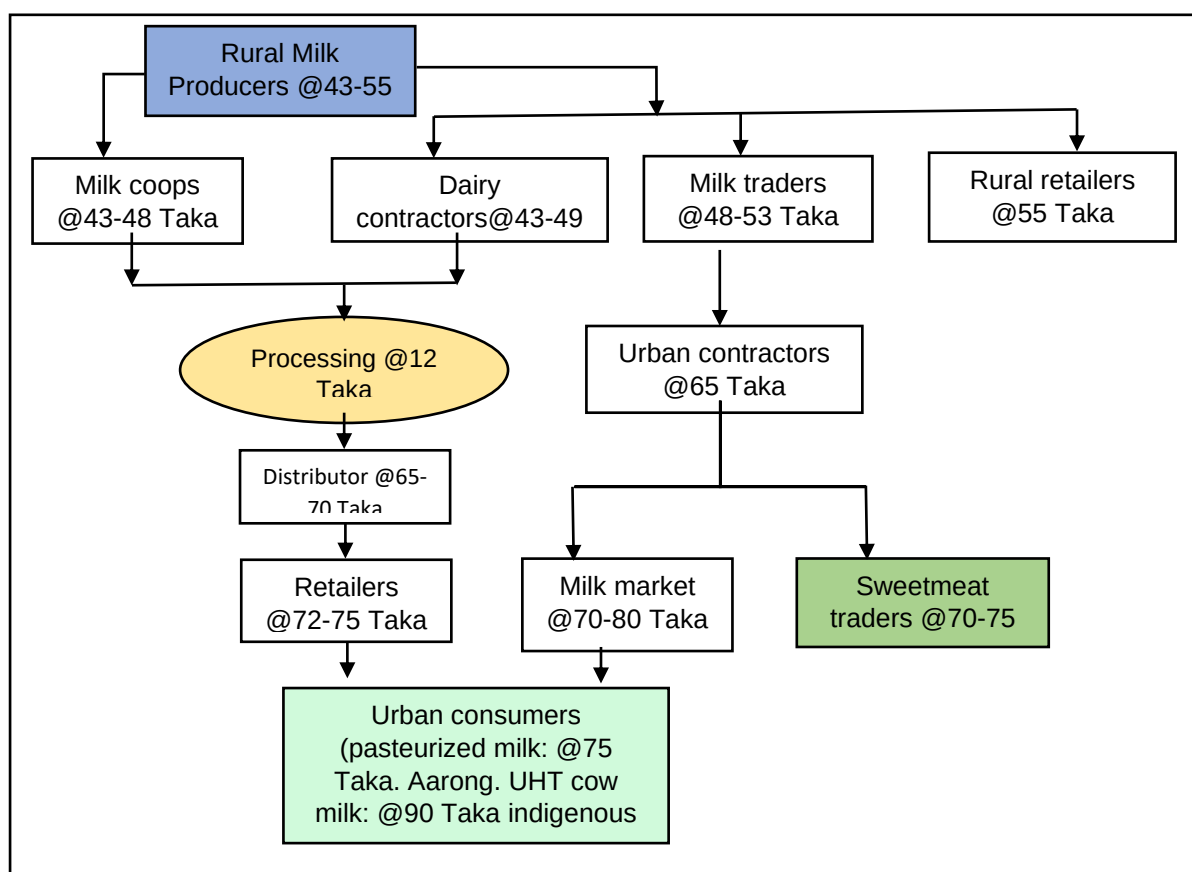


Figure 18: Milk Price at Different Stages of the Value Chain as of 1/9/2022

The producer groups ranked their first choice being beef fattening for profitability, dairy cows (milking) for cash flow and Desi chicken and ducks for convenience in management (see Figure 19). The key is to have a mix of species that minimizes the risk of business failure and maximizes profitability and cash flow.

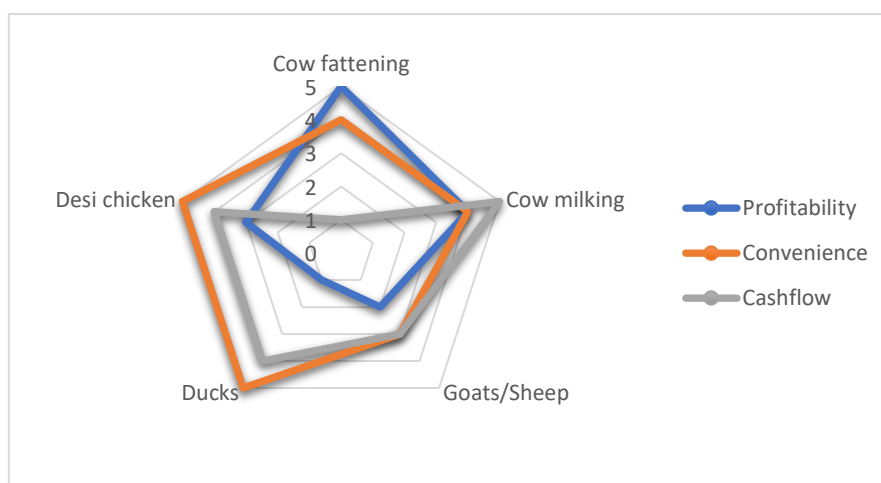


Figure 19: Preference Ranking by Producers

7.0 Risk and Mitigation Measures

The livestock sector needs utmost care for the animals, with better management practices to keep the animals and birds healthy and productive in order to make the business economically attractive/profitable. A number of factors such as the outbreak of diseases, product marketing, natural calamities (flood, cyclone, drought and saltwater intrusion), climate conditions, farm management factors, government policies, consumer concerns and even the period of service delivery could turn out to be significant risk for the livestock producers and entrepreneurs. The livestock producers and entrepreneurs have to be vigilant of the risks involved in the market by taking all the precautions as a regular activity of the business. The government is better placed to mitigate some of these risks than the individual livestock producers and entrepreneurs. Major risks, severity of their impact, and mitigation measures in the livestock sector are illustrated in Table 17.

Table 17: Risk Identification and Mitigation Measures

Risk	Impact	Mitigation Measures
Disease outbreak, e.g., FMD, PPR ⁸ , Mastitis	High	Regular vaccination, disease awareness campaigns, surveillance, and control of zoonotic diseases
Transboundary animal diseases/ Avian Influenza	High	Surveillance and biosecurity protocol at the farm level; culling of diseased stock.
Natural calamities, e.g., typhoons, floods, droughts	High	Silage, straw and hay stores, fodder banks, propagation of drought and saline tolerant species of fodder.
High feed cost, low price of products due to marketing problem	High	In-country production of concentrate feeds, increased production of HYV fodders (for milking cows), improvement of marketing system
High cost of livestock finance	High	Use of innovative instruments pool credit risks, introduce credit guarantees for viability gap funding.
Import of meat and products of animal origin	Moderate	Strict enforcement of national standards, and Codex Alimentarius ⁹ .
Lack of livestock insurance	Low	Pilot projects, demand creation for cattle insurance.

⁸ FMD – Foot and mouth disease; PPR - Peste des petits ruminants, an infectious disease of small ruminants

⁹ A collection of internationally recognized standards, codes of practice, guidelines, and other recommendations published by the Food and Agriculture Organization relating to food, food production, food labelling, and food safety.

8.0 The Supporting Factors

The success of Bangladesh in modernizing livestock will be influenced by the supporting factors which include natural resources, infrastructure, quality of human resources, technology development, availability of climate finance for the livestock sector, access to market, and a cooperative government.

Infrastructure: The need for decongestion of roads is one of the most pressing factors concerning production operations & logistics and would contribute to avoiding the damage of the products. Electricity supply is erratic, and expensive taking a heavy toll on businesses. Biogas facilities, renewable power generation and waste management at farm level will not only address environmental concerns but also enable reliable power supply. Much focus is required on developing well managed modern slaughterhouses and cold chain networks for both dairy and meat value chains.

Quality of human resources: Bangladesh has invested heavily in higher education rather than developing skills of technicians. There is shortage of skilled manpower in slaughter houses, dairy and waste management in small farms and climate smart practices. Some public departments such as the Department of Agricultural Extension, and DLS as well as NGOs, conduct various technical and managerial trainings. However, most of these trainings are not associated with field-based training and handholding, which is huge problem as this is exactly what the producers need.

Technological innovation: Livestock technology can enhance or improve the productive capacity, health, welfare or management of animals and birds. In the last decade, tracking and managing livestock has become much easier and data driven. This new development has positively impacted nutritional technologies, genetics, digital technology, and more. Bangladesh can leap frog adoption of digital technology by fitting sensors on high yielding milking cows to monitor health and increase productivity. Putting individual wearable sensors on cattle can keep track of daily activity and health-related issues while providing data-driven insights for the entire herd. It can improve the productivity and welfare of livestock by detecting sick animals and intelligently recognizing room for improvement. Computer vision allows us to have all sorts of unbiased data that will get summarized into meaningful, actionable insights. Data-driven decision-making leads to better, more efficient, and timely decision-making by the producers/entrepreneurs that will advance the productivity of livestock herds. The mapping of fodder production zones and land use changes will aid policymakers in devising better strategies to address fodder shortages. Data is the basis of genomics. By being strategic with animal selection and breeding decisions, cattle genomics allows producers to optimize profitability and yields from the livestock herds.

Climate Smart Financing: The access to credit for the small producers/entrepreneurs has been difficult from traditional financing sources (commercial banks/financial institutions) as they consider livestock sector as overtly risky, with little potential for significant growth. Innovative approaches to financing are needed in the market. In a sub sector that plays an essential economic role for some 80% of rural households, covering 14 million households and that contributes up to 13.10% of agricultural GDP, reducing carbon emissions while maintaining livelihoods and reducing poverty is essential. The potential for climate finance for livestock is by and large untapped in Bangladesh. If designed properly, climate finance can accelerate transformation towards low-carbon and sustainable livestock value chains. Proven mitigation solutions exist, such as improving animal feed to reduce methane emissions or efficient land management to increase carbon sequestration, including the restoration of depleted soils. Climate smart technologies on water conservation, energy efficiency, renewable energy generation, livestock monitoring and most importantly waste management will improve the productivity and enhance the quality of livestock rearing. However, implementing these solutions require proper financing, and climate finance will play a crucial role in their wide adoption for a transition towards low-carbon livestock (World Bank. 2021).

9.0 Overcoming Marketing Challenges

Proactive marketing strategies have proven the key to success for many agricultural enterprises.

Producer Organizations as inclusive agri-business intermediaries

In South Asia, farmer producer collectives have successfully demonstrated the potential of collectivization to access cheaper inputs, improve bargaining power and gain access to diversified markets. It has been observed that small-farmer owned POs have been able to garner better price per unit by capturing the price dispersion between farm gate and wholesale prices while also catalyzing a corrective effect in local market practices - with existing intermediaries adopting fairer market practices to compete with new institutions.

Established livestock markets are controlled by local cartels. The traders' rent seeking behavior and high transport costs act as disincentives to livestock producers' participation in livestock markets. The market transactions are non-transparent with very little or no opportunity for price discovery. Most producers prefer to sell their cattle and goats to village trader knowing fully well that this may not be best bargain. Rather than accepting the relatively low prices typically offered by traders, POs can either on their own or in collaboration with direct marketers establish direct connections with institutional customers, providing them an opportunity to buy fresh products – grass-fed beef and mutton, toxin free milk, or free-range eggs – and knowledge about how they've been grown. In return, producers learn what their customers like, then fill those needs with products, often at a premium.

POs may consider selling at producers' markets ("Haats"), opening a sales outlet for inputs and value-added outputs, offering on-farm activities like educational tours, selling via the Internet, or marketing to restaurants and schools.

An alternative is to create an online portal where producers themselves advertise their animals with a description and photographs of what they are selling. Buyers either contact the seller direct, or, if they use an agent or livestock dealer, take the enquiries on the seller's behalf. Currently, smartphone penetration in Bangladesh is 40 percent and will grow to 69 percent by 2027, which will further ease E-commerce by producers.

Most producers use a combination of marketing methods – both value-based strategies bringing higher returns and volume-based channels selling more products – finding that diverse marketing strategies provide stable profits and a better quality of life. Selling at a producers' market may provide contacts for other channels, such as special orders or subscriptions, and receive valuable feedback from customers. The trick is to learn what the customers want and ensure back-end production meet to meet their expectations.

Value Addition in Dairy Sector

Value-added products in the dairy industry are products like flavored milk, ice cream, paneer, ghee, yoghurt, probiotic drinks, dairy whitener etc. These are products which have been created by alteration, enhancement via additives, segregation etc. of liquid milk. While packaged liquid milk continues to remain a key driver in the dairy sub sector, value-added products have strong potential to grow 15 percent to 20 percent year on year. The technology has varied products like cheese, UHT milk, curd, baby foods, ice-cream, butter, flavored milk, and dairy whitener. As the production and consumption of milk is increasing in Bangladesh, so is the opportunity to sell these value-added products. Further, the technology and know-how for these value products are scale neutral and can be easily adapted to MSME.

Government procurement

Government spending in Bangladesh was last recorded at 15.3 percent of GDP in 2016. The Bangladesh Government spending is projected to trend around 1982.00 BDT billion in 2022 and 2121 BDT billion in 2023. Some of this spending could be tapped to create market opportunities for milk, meat, and egg producers. Among the large Government institutional buyers are the army, police and Government run educational institutions.

Armed forces personnel, total in Bangladesh was reported at 227,050 in 2018. There are also 256,344 personnel stationed in 651 police stations. There are approximately 23,500+ high schools controlled by seven educational boards and 17 polytechnics under the Directorate of Technical Education (DTE) in Bangladesh.

The army could be persuaded to include PO federations as vendors for frozen chicken, mutton, and beef. This will enable participation of capable PO federations to supply Meat/Broiler frozen in future. There is a need to simplify the registration and payment procedures by introducing a single point registration and verification of vendors as also remitting faster payment so as to realign the procedures and eliminate such aberrations. Likewise, opportunities to open PO outlets in Police stations and educational institutions should be explored with concerned authorities.

Contract farming

Contract farming is a potential mechanism to reduce the risk of production, price and marketing costs. Contract farming can open up new markets which would otherwise be unavailable to small producers. It also ensures higher production of better quality, financial support in cash and /or kind and technical guidance to the producers. Contract farming has made small inroads in broiler chicken production and dairy milk. A study of broiler chicken by Roy et al. (2021) found that contract participation enhances producers' net returns by as much as 215–280% and raises compliance with food safety measures by around 13%. Increased productivity and provision of non-price attributes such as food safety in the product account for the difference in farmer returns. Another study by Islam et al. (2019) of producers supplying milk to PRAN and Milk Vita observed that contract producers are more likely to have better access to agricultural extension services, attended proportionately more community meetings, household members are member of organizations, access more credit, are located farther from output market, and have larger herd sizes. They observed that contract farming has a robust positive impact on welfare measured by expenditure, farm profit and farm productivity, and food safety practice adoption even after innovatively controlling for observed and unobserved heterogeneity among dairy producers. More specifically results indicate that a one unit increase in the likelihood of participating in contract farming is associated with a 42, 35, 34 and 9 percent increase in household expenditure, gross margin and net margin per cow, and food safety practice adoption rate respectively, among other positive impacts.

School Milk Program (SMP) for Pre-Primary School Children

The destructive impacts of poor diets and malnutrition on children's health, school performance and intellectual ability are well known. School milk programs (SMPs) present valuable opportunities to positively affect child and adolescent development. SMP has multiple benefits, including increased access to education, improving nutrition and health, and stimulating local economies. SMP often serves as a safety net to ensure adequate nourishment for children, which has been reinforced during the COVID-19 pandemic. School

milk program are ongoing in UK, USA, Australia, Malaysia, Thailand, Ecuador, Morocco, Romania, Mexico, and Iran. (see Box for SMP experience in Thailand).

According to Wikipedia, there are 14,671,914 children spread over 63,041 Government primary schools in Bangladesh. 100 grams of milk per child for 200 days would require supply of 293,438,280 liters of milk per annum. At 35 Taka/liter, the total value of milk required is 10,270 million Taka. Resources to meet the expense for milk could be financed by ministries of education, local government, bilateral and multilateral donors and parents of children. SMP could begin in milk rich districts before spreading country wide. The SMP is a time-tested way of boosting local demand for milk.

Box 3: School Milk Program of Thailand

In 1992, the Ministry of Education of Government of Thailand launched a school milk program to provide milk for pre-primary school children and later extended it to primary school children. Currently, there are more than 6 million school children who are provided 230 cc of milk per day over the course of 230 days in a year.

The importance of the school milk program is two-fold. First, it is creating a milk-consumption habit among a younger Thai generation – the school milk program has played an important role in the increase of per capita dairy consumption in Thailand over the past decade. The government policy emphasizes daily milk consumption among school children up to age 14 years to promote good health and decrease under nutrition. The SMP has contributed to a successful reduction in under-nutrition among children under 5 years old from 20% in 1990 to 10% in 2006 (Yothasamut et. al. 2018), and 7% in 2020 (Development Initiatives, 2021).

Second, processors supplying the school milk program are only allowed to use local raw milk to produce pasteurized and UHT milk. Since 2004 all school milk supplier must be HACCP certified. The milk suppliers are large and small cooperatives and private dairy factories. The milk is distributed in pasteurized sachets for most schools and in UHT packages in remote areas. Thus, the program is an essential outlet for local raw milk, absorbing a volume of 275 000 tonnes per year, or more than 30 percent of local milk production, in the country. The cost of milk is largely subsidized by the Federal Government. School milk is priced 25% less than the market. Parents purchase milk through monthly coupons for their children in Primary and Kindergarten schools. Milk is distributed in long life (UHT) packs for parents to pick up from schools. The Ministry of the Interior, and the Ministry of Education are the concerned line Ministries for the program. Oversight is exercised by the National Milk Policy Committee under the office of the Prime Minister.

Public-Private-Partnerships (PPP) for Integrated Meat Processing

Bangladesh has several PPP projects in the transport, energy, and social infrastructure sectors, which includes health care, economic zones, and tourism. PPP is recognized as an effective tool to leverage private sector resources to address the public investment gap in infrastructure and overcome the government's fiscal constraints. There is a scope to design PPP for the livestock and poultry sectors to provide incentives for private sector participants to modernize or set up new abattoirs, cold chain and improve distribution systems of meat, feed and fodder, and vaccine. Meat processing plants and slaughterhouses assure production and marketing of hygienic meat through a chain of modern meat shops in the country and sets in motion a demand driven backward linkage between the company and the livestock producers and accelerates the economies of scale and contributes to intensive livestock farming.

10.0 Governance Issues in Value Chain Management

Value chain governance refers to the relationships among the buyers, sellers, service providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use.

Currently, small producers in Bangladesh largely operate in an atomistic, independent of any formal contractual binding (see Box below for an illustration of transactions in backyard poultry). As the value chain gets formalized and integrated into global market, the individual producers are aggregated into networks and corporate-like structures. The basic principles of corporate governance like accountability, transparency, fairness, and responsibility become part and parcel of organizational behavior. The market players in value chain integrate environmental and social considerations in their corporate strategy, profit sharing, and risk management.

Governance is an important instrument to improve the performance of value chains and sustain / increase their competitive advantage. A particular governance system can either help a firm or a producer group to grow and develop, or it can retard its growth.

Box 4: Governance in backyard poultry value chain in rural Bangladesh

Landless households and smallholders (average landholding of around 0.6 ha) raise local breeds of chicken for home consumption and occasional sale in market. Indigenous breeds or types such as nondescript Desi, Aseel Naked Neck, Chittagong Hilly, and Red Jungle Fowls are popular because of their tender meat, taste, and perceived nutrition value. The non-descript Desi chicken is more acceptable to rural people as an important source of meat and eggs due to lower feed intake and higher resistance to diseases and heat stress. The producers sell their stock to aggregating village traders, walk in customers or in local weekly markets. The Desi breeds are generally sold at the same price as exotic meat producers (Cobb 500, ISA Brown, Fayoumi and Sonali) which has less appeal to local taste. The small producers do not grade the produce and convey the niche properties of their produce. The result is they are not able to set forth their own quality related pricing.

Hand-holding, technical assistance, marketing support and bank credit linkages are important elements for nurturing infant producer organizations. The case of Bhanga Panjor Women's Cooperative (see Box below) illustrates that support might be needed for 7-10 years.

Box 5: The rise and stagnation of a Women's Dairy Cooperative in rural Bangladesh

Leadership and external support often shape the trajectory of organizational evolution. Take for example the Panjor Bhanga Women's Milk Cooperative, which is one of the well-known all women enterprise in rural Bangladesh. The Cooperative was supported by World bank and the FAO under the Integrated Agricultural Productivity Project (IAPP) launched by the Government of Bangladesh in 2011. The IAPP project worked directly with the community to develop climate-smart infrastructure, build knowledge and skills on farming practices, provide better quality inputs, and link producers to markets.

Ms. Renu Bala is the founder and leading light of the Milk Cooperative. Her village near Kaunia of Rangpur district is a low land area and flooding is a recurring annual event. The women of the village are very poor, none have more than one Desi cow. Yet, during the floods, these cows are the main stay. Renu felt that if she can start a dairy business, and other women join in, everyone will benefit. In 2011, due to Renu's perseverance, 15 women came together to form Panjor all women cooperative. In 2015, Mutual Trust Bank provided USD 13,000 as loan to the cooperative for the purchase of high yielding Friesian dairy cows. From the sale of the heifers, the Coop paid back the loan in full in two years. Thereafter, Rupali Bank provided a second loan of USD 10,000, which by 2016 had expanded to 30 women. Milk productivity jumped from 1 to 2 liters to over 10 liters per cow per day.

The women also use a lactometer to test milk fat content to ensure they reach the 4% level that garners premium prices. They now collectively sell the milk to local sweet shops and to milk processing companies. In 2016, the milk sale was 200 liters/day. Unfortunately, with the closure of IAPP project in 2016, the Cooperative could not get further bank loans to buy new Friesians. Over time, the Friesen cows lost considerable genetic purity, and milk yield plummeted to 4-6 liters a day. In 2022 the number of Coop members stood at 72 (68 women and 4 men) who sell 80 liters of milk @38 Taka to middle men. The milk sales generate valuable income for the women, and 20% of the revenue is deposited in their Cooperative savings account for future investments.

The main challenges of the Coop are rising feed cost, lack of milk chilling facilities, no bank credit linkages, inadequate vaccination coverage, and repeated floods during the last three years. The main learning from this case is threefold: grassroots organizations require handholding for many years, access to finance is essential for growth, and a robust marketing system for milk is necessary to sustain business viability of small producers.

With growing globalization of the economy, there is need for finding new governance institutions to facilitate the operation of value chains by establishing property rights, enforcing contracts, establishing rules of fair competition, and providing information. There is need for better regulations to address the negative environmental externalities of private market transactions. Without constraints or incentives, markets would increase the livestock population that may further constrain environmental carrying capacity. Currently, the market is unfavorable to small producers. Governance institutions play a crucial role in limiting and mitigating the unequal impacts of markets. Social insurance, health care, public education and retraining, progressive tax systems, and other welfare policies all serve to temper the tendency of markets towards highly unequal outcomes (Mayer & Gereffi, 2010). In

The National Livestock Development Policy 2007, prepared by the Ministry of Fisheries and Livestock (MoFL), introduced the idea of a national dairy board to regulate and promote the dairy sector. It expected the private sector to remain the main actor in livestock sector, while the public sector plays a facilitating and supportive role. The objectives of the policy are to promote sustainable enhancements in the productivity of livestock and poultry production including processing and value addition and also to promote sustained improvements in income, nutrition and employment for the landless, small and marginal producers. It lays out the need to facilitate increased private sector participation and investments in livestock production, livestock services, market development and export of livestock products and by-products. The policy document elaborated policies for dairy development in the country and these are:

1. Expansion of cooperative dairy in potential areas following the Milk Vita Model,
2. Replication of pro-poor models for community-based smallholder dairy,
3. Promotion of integrated dairy farming,
4. Strengthening of forward linkages to dairy producers,
5. Establishment of a National Dairy Development Board to promote dairy, and
6. National Dairy Research Institute to strengthen dairy research and development activities.

Moreover, encouraging private sector's participation, establishment of producers' information network taking help of the private sector, increasing easy access to micro-finance and insurance, establishment of a livestock credit fund in the Central Bank are some of the important policy issues included in the document for the development of the smallholder dairy industry in the country.

Work is slowly progressing on the establishment of a Dairy Development Board. The LDDP project document envisages establishment of a Dairy Development Board under Component B: Market linkages and Value-Chain Development.

The major objectives of the proposed Dairy Development Board are likely to include:

1. Ensuring the balanced growth of Dairy sector in line with other industrial sector growth.
2. To promote projects of general public utility relating to dairying, animal husbandry, food and agriculture, and cold storages.
3. To make available, on request, the information, skills and technical services needed to increase production of milk and dairy, technical inputs to speed up procurement, processing and distribution of milk.
4. To provide manpower services for dairy and allied projects by organizing technical programmes for training personnel.
5. To serve as international liaison to other national dairy boards and international agencies and to facilitate the exchange of information and personnel as also to assist other country's dairy development.
6. To conduct research in the field of dairying and animal husbandry.

Besides the Dairy Board, there is room for a National Dairy Association, comprising of producer/farmer organizations, dairy cooperatives, and dairy companies. The association will function as a self-regulatory organisation (SRO); the priority is to protect producers, and milk processors by establishing rules, regulations, and set standards of procedures that promote ethics, equality, and professionalism. The SRO will have the power to set industry standards and regulations through its own efforts. It will have the technical expertise to provide standards and enforcement of those standards on their members. The SRO will be a private, voluntary effort banding together producers and processors in way that will allow them to maintain competitiveness and safety concerns if there is a lack of governmental oversight. The association could be registered as a limited company, formed and managed under Company Act, 1994. There are many successful examples of SROs in Bangladesh; to mention a few these include Bangladesh Foreign Exchange Dealers Association (BAFEDA), the Bangladesh Cricket Control Board, Dhaka Stock Exchange (DSE), Association of Development Agencies of Bangladesh (ADAB), Federation of NGOs of Bangladesh (FNB) and International NGO Network, the Institute of Chartered Accountants of Bangladesh etc.

The dairy SRO's objectives are:

1. Ensuring that remunerative price is paid to the milk producers.
2. Ensuring the availability of processed liquid milk to consumers at reasonable price
3. Ensuring the credibility of the dairy Co-operative, companies, and NGOs and other structure through transparency in administration.
4. Ensuring the quality of milk and milk products as per statutory specifications imposed by the Bangladesh Food Safety Authority (BAFSA).
5. Bringing the unorganized dairy sector into the organized sector.
6. Ensuring that various inputs such as cattle feed, fodder and Veterinary health services are provided to cows owned by the milk producers.
7. Introducing and updating the latest technologies in various dairy activities at the level of VMCC, Dairy Hub and integrated milk plants.

An ideal and functional self-regulatory organization should be able to demonstrate the following traits:

- a) Legislative authority – The SRO should be given the legislative authority that allows it to create policies and enforce them in a specific industry. The Ministry of Fisheries and Livestock may help the formation of the SRO, and accord it due recognition after proper due diligence.

- b) Strong governance is essential to earn credibility - The SRO must be transparent and not easily swayed by internal or external pressure.
- c) Finally, an SRO must have multiple sources of revenue: membership fees, consultancy earning, grants and donations from national and international organizations.

11.0 Mainstreaming Gender Issues

Traditionally in rural Bangladesh, livestock is one of the few productive assets that women can control and that they can utilize to secure daily the nutrition of their household and of themselves. This makes livestock a convenient entry point for both nutrition security and women's empowerment. However, women tend to own species of lower economic value - small ruminants and poultry – while men own dairy animals. With livestock intensification women tend to lose control over the revenues generated through livestock. It is, therefore, necessary to take into account how gender dynamics and norms affect livestock management and consequently labor allocation and benefit accrual. Livestock interventions may accentuate gender inequalities within households. However, it doesn't mean that the country should not move forward to livestock development and commercialization. The policymakers should find new means for better empowerment and more earnings of the females for their families.

In rural Bangladesh, women's participation in economic activities in general and in agriculture in particular has remained low. But recent labor force surveys conducted by the Bureau of Statistics show rapidly increasing participation of women in economic activities. The progress is attributed to poverty, empowerment of women by NGOs, and migration of male members from agriculture to non-farm occupation. With the absence of male members, women's role is changing from unpaid family worker to farm managers, a phenomenon termed as "feminization of agriculture". Women's participation is mostly in feeding and watering livestock, cleaning of animal sheds, chopping of straw, care of new born calves, and management of growing calves. The farm women participation is least in farm record maintenance, artificial insemination (AI) practice, purchasing of feeds and fodder. Men tend to have greater say on purchase of animals and feed, negotiate financial transactions, and deciding on whom to sell milk. Women struggle to access and maintain control of financial resources generated by sales of large animals. The time allocated to livestock and poultry farming (which is a marginal economic activity) is only 0.91 hour of labor per day (Jaim, & Hossain, 2011). However, with the introduction of large animals, women tend to spend up to three hours in tending them.

The empowerment of women in the livestock sector is fundamental to achieve gender equality. It also is instrumental for increased household productivity and improved household health and nutrition. Diverse strategies exist to empower women, yet these strategies are difficult to prioritize without a reliable and adapted means to measure women's empowerment.

There are at least three pathways through which interventions can influence the livelihoods of women livestock keepers and their families: securing current and future assets, sustaining, and improving the productivity of agricultural systems, and facilitating greater market access (Kristjanson et al. 2010). Evidence from Strengthening the Dairy Value Chain Project (SDVCP) in Bangladesh show that asset values increased for both men and women, with women building up more assets through joint ownership with men (Quisumbing et al., 2013). The greater control and access to assets, was associated with more control over household expenses. In addition, women from participating households had greater access to livestock health workers, such as veterinarians, which facilitated improved animal husbandry practices (Islam et. al. 2019).

A major issue highlighted by women livestock keepers is the lack of access to information on markets, government regulations, credit, and veterinary care, which limits their ability to respond to livestock related opportunities or challenges. For example, due to their role in livestock care, women are often on the front lines of disease diagnosis. However, they often do not have access to the information or training to help prevent disease outbreaks. A way to overcome this challenge is by training women as community vaccinators in order to control diseases. Women can contribute to increased livestock productivity through improved feeding practices, breed specialization, animal health improvements, and improved resource usage. However, for this to happen, their role in animal care requires due recognition.

The third pathway indicates that women livestock keepers face a trade-off between sale and consumption of meat, milk, and nutrient-rich dairy products. Furthermore, they face many obstacles to market participation such as insecure livestock ownership, and lack of access to inputs or extension services necessary to capitalize on market opportunities. Some of these obstacles can be mitigated through improving women's access to resources and markets. Higher participation in market-oriented activities increases time spent on dairy activities within the household for women and outside of the household for men. This may have the unintended effect of reducing women's time for household activities and increasing girls' household chores.

Applying a gender focus to value chain analysis helps to identify how gender-based opportunities and constraints affect how women and men participate in and benefit from value chains (World Bank, FAO, and IFAD. 2009, Kabeer, 2011). Further research is needed to assess the impact of policy changes, infusion of new technology and commercialization of livestock on how gender dynamics may change in the future, and affect intra-household work allocation and decision-making.

12.0 Livestock Sector and Climate Change

Bangladesh is considered as one of the most vulnerable countries to climate change because of its disadvantageous geographic location; flat and low-lying topography; economic dependence on agriculture, high population density and recurrence of natural calamities. The country is the 33rd most vulnerable country and the 25th least ready country, meaning that while it is highly vulnerable it is not ready to prevent or reduce climate change effects (MoFA, 2018). Intergovernmental Panel on Climate Change (IPCC) in 2021 reported that climate impacts are at the high end of previous estimates, with all parts of the world being affected. Bangladesh has three major climate change affected areas: coastal belt in South-Western area, Drought-prone North-Western area and Flood affected middle part of the country. The major climatic hazards are flood/flash flood, heat wave, drought, erratic rainfall, sea level rise and cyclone. The recent report by, IPCC, released in 2021, pointed out that an erratic monsoon could lead to variability in local levels of rainfall and to frequent and intermittent flooding events. As a result, the coastal zone of Bangladesh will be highly susceptible to inundation and salinity, which will most likely hamper agricultural production and affect food security. It has been estimated that by 2050, natural disasters linked to climate change will cause displacement of one in every seven people in Bangladesh. Specifically, with a projected 19.6 inch (50 cm) rise in sea level, Bangladesh may lose approximately 11% of its land by then, and up to 18 million people may have to migrate because of sea-level rise alone.

Climate change is having significant negative impact on livestock development in Bangladesh. Many of the anticipated adverse effects of climate change, such as sea level rise, higher temperatures, drought, enhanced monsoon precipitation, and an increase in cyclone intensity, will aggravate the existing stresses that impeded livestock development in Bangladesh,

particularly by reducing water and food security and damaging essential infrastructure. There are both direct and indirect effect of climate change and climate variability. High temperature (heat stress) results in reduced feed intake, increased water intake, and altered physiological functions such as reproductive and productive efficiency. Nardone et al. (2010) has reported that one of the major causes of decreased production in the dairy and beef industry is increased temperature. Poultry birds are badly affected by high temperature as they have no sweat gland and therefore no heat dissipation from the body. Climate change also causes reduction in quantity and quality of forage production. Impacts of climate change extends to microbial communities (pathogens or parasites), spreading of vector-borne diseases, food-borne diseases, host resistance etc. It is evident from the Post Monsoon assessment by RIMES in 2020 that because of the preparedness for ensuing Monsoon (heavy rainfall) as early warning, the saving of BDT 39,460 was made possible in one season. The World Bank (2010) estimated the damages and losses of an additional \$56 million in the livestock sector.

Bangladesh has developed some capacity for dealing with the anticipated impacts of climate change at the national level, and policy response options have been mobilized to enhance the resilience of infrastructures, institutional capacity, and financial preparedness, and to help vulnerable communities to adapt and manage residual risks through the formation of National Adaptation Plan of Action (NAPA) in 2005 and Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2009. The government developed Bangladesh Climate Change Trust Fund (BCCTF) from its own revenue. Bangladesh government is also paying increasing attention to reduce impacts of climate change on animal health and the spread of pathogens – as many emerging diseases have an animal origin. Very recently DLS has signed an MoU with Regional Integrated Multi-Hazard Early-warnings for South-Asia (RIMES), working on climate change adaptation in livestock sector of Bangladesh under World Bank funded CARE project.

Climate change poses a threat to sustainable livestock development. The impact of climate change on livestock can be transmitted through:

1. Rise in sea levels, which will inundate coastal belt and char lands and reduce the grazing facilities.
2. Intrusion of saline water in coastal regions, which will increase stress factors and therefore, will not be conducive to livestock rearing.
3. Vegetation will be destroyed, leading to serious feed scarcity, resulting in reduction of livestock population.
4. Increased frequency of natural disasters, causing colossal damages to livestock.

In the aftermath of such disasters, productivity declines due to shortages of animal feed and outbreaks of disease. The impact on feed, land and water resources, animal health, logistics and animal products are complex and interconnected, as displayed below (see Figure 20).

Changes in mean climate trends, overall variability and extreme events

- Atmospheric CO₂
- Temperature rise
- Cyclones, typhoons, and excess precipitation
- Sea level rise and saline ingression
- Loss of cultivable land

Source: Adapted from Godde et al. 2021

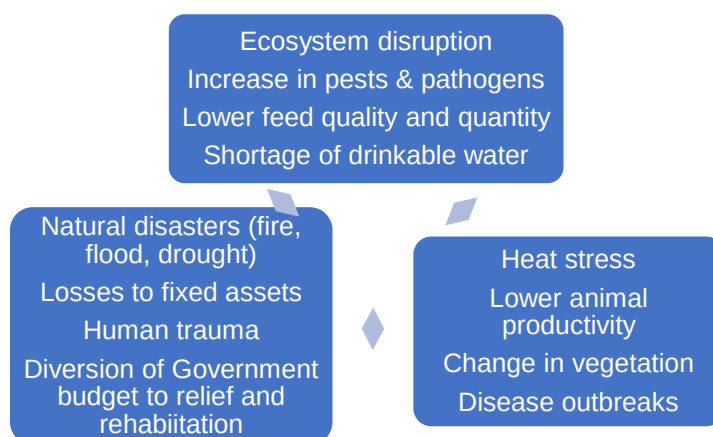


Figure 20: Climate Change Impact on Livestock

13.0 Monitoring and Evaluation of Value Chains

The monitoring of outcomes/results will be based on the results framework and monitoring arrangements that are described in detail in Table below. The projects' M&E function will be ICT driven and track progress in activities, outputs, and intermediate outcomes using indicators from the results framework.

Box 6: Monitoring System for Climate Change Adaptation Using Poultry

To address the problem of climatic disasters and poverty simultaneously, sustainable livelihoods could be better connected with disaster risk reduction. For this purpose, the Bangladesh Red Crescent Society – part of the world largest humanitarian non-governmental organization, The International Red Cross and Red Crescent Movement - implemented the Vulnerability to Resilience (V2R) project which ran from 2012 to 2016. With the funding of British Red Cross, the project covered 30 communities of Kurigram district comprising 19 Unions of 04 Upazilas (Kurigram, Rajar hat, Ulipur and Fulbari) where about 20,000 families benefited. Wherever feasible, people from the communities were organised into producer groups and provided technical and market access training. A popular activity that emerged was poultry (chicken and ducks) rearing.

As part of the V2R livelihood activities, initially the poorest and most vulnerable 12% people from each community were selected for cash grants to landless or particularly vulnerable in other ways—such as poor female-headed households and the households having people with disabilities, elderly, or children. Each household was granted 15,000 BDT i.e., USD 191 (USD 1= BDT 78.50 on 5 May 2016). The expenditure was restricted according to business plans for livelihood activities prioritized by producer groups such as cattle rearing (beef and milk), poultry (chicken and ducks), and retail businesses (small shops). The profitability was also calculated for each business plan.

A monitoring system was developed for all the beneficiary households after the grants had been disbursed. At the start of the project, nearly one-third of participating families earned below \$40 per month. After three years almost all had monthly incomes of \$65, with over half bringing in between \$50 and \$200.

Source: Ahmed, B.; Kelman, I.; Fehr, H.K.; Saha, M. Community Resilience to Cyclone Disasters in Coastal Bangladesh. *Sustainability* 2016, 8, 805. <https://doi.org/10.3390/su8080805>, and Vighnen, John and Jannat Sahaha, Final Evaluation of Vulnerability to Resilience (V2R) Project in Bangladesh 2012 – 2016. British Red Cross, UK. (mimeo).

Table 18: M&E Indicators and Data Collection

Sl.	Indicator	Frequency	Source of verification	Responsible Party
1	Producers adopting improved agricultural technology (CRI, Number)	Annual	MIS and Progress report	PMU/PIU
2	Producers adopting improved agricultural technology - Female (CRI, Number)	Annual	MIS and Progress report	PMU/PIU
3	Increased productivity of targeted species by direct beneficiaries (Percentage)	Annual	MIS and Progress report, Sample survey	PMU/PIU
4	Increase in market access reflected in incremental sales (aggregated over all targeted value chains) in real value in the project area (Percentage)	Annual	MIS and Progress report, Sample survey	Do
	Increase for female producers (Percentage)	Annual	MIS and Progress report	Do

14.0 Intervention Matrix

Based on the findings, few intervention areas have been identified. Together with stakeholders from the sector, the study team has formulated intervention proposals and activities, which it believes will improve the conditions in the livestock and dairy value chain and related areas, create more income and promote growth and hopefully make the sector more competitive. These are presented in the intervention matrix. Not surprisingly, there are topics that are overlapping between the categories, but they are still presented in each intervention area to have the complete picture group by group. The Department of Livestock Services may lead the interventions in every district. It is however recommended that a task force and a larger group of partners become involved as responsible partners.

Six areas for interventions have been identified, namely:

- 1.) Reduce feed price and improve feed quality;
- 2.) Market linkages and development;
- 3.) Promote product diversification;
- 4.) Improve efficiency of supply chain;
- 5.) Improve support structure and services for the sector; and
- 6.) Improve the enabling environment.

Reduce Feed Price and Improve Feed Quality

Feed costs commonly make up 70-90% of the total costs of intensively housed chickens or laying hens. For other livestock feed cost covers 70 – 80% of the total cost. Feed price in Bangladesh is rising exponentially every year. It has been observed that between 2018 and 2021, the price of the major feed ingredients has risen sharply (see Table below). Wheat bran, rice polish, rice straw and soybean meal rose by 11.91%, 12.32%, 20.84 and 31.17%, respectively.

Table 19: Price Change of Animal Feed Ingredients (2018-21)

Feed ingredients	Price per kg in BDT					
	2018	2019	2020	2021	Aggregate (2018-2021)	Price change % (2018-2021)
Rice Straw	11.18	8.96	10.16	13.51	10.95	20.84 ↑
Wheat Bran	31.66	33.02	35.61	35.43	33.93	11.91 ↑
Mustard Oil Cake	35.55	35.58	36.38	38.88	36.60	09.37 ↑
Rice Polish	13.55	13.81	13.08	15.22	13.91	12.32 ↑
Maize/Corn	24.72	24.61	23.90	22.92	24.04	-7.28 ↓
Soybean Meal	33.46	33.46	39.89	43.89	37.67	31.17 ↑

Source: AFC/SSIL team calculations based on market survey prices.

Reducing feed cost is an important task for securing profit margin of farmers. Examine options to reduce feed costs by discussing diet formulation modifications with a qualified animal nutritionist. However, the following options can be adopted to reduce feed cost a) increasing addition of green fodder to dairy and fattening animals' diet b) encouraging farmers for preservation of fodder as silage and hay for lean period feeding c) increased cultivation of soybean d) utilization of agro-industrial and marine by-products as concentrates.

Quality norms followed by Bangladesh feed industry needs to be aligned with the international standards to have more credibility. The legislations already in place need to be updated with a more vigil regulatory framework and also can be put in place to ensure the adherence to the legislations. The availability of good quality and cheaper raw materials can help to attain self-sustenance in animal feed production and maintaining of international quality norms can open business possibilities of export as well.

Any good feed quality- control program contains four components: ingredient quality checks, control of toxic substances, including pathogenic micro-organisms, process control at the level of manufacturer, and certification of finished feed products. The best point to start feed quality control is ensuring that the product manufacturer meets specifications established by national food safety authority. Feed producers should strictly maintain the quality control guidelines of The Animal Feed Act 2010 and Bangladesh Standards and Testing Institute (BSTI). It is good that The Feed Act Regulation 2013 authority is in action to implement the Act and periodically test the quality of commercial feeds produced in the country.

An area of potential research is the impact of LDDP on lowering of cost of production of small producers across all the value chains. For comparative purposes, baseline data may be collected of households and enterprises and then compared by October 2023, i.e., 3 months before the end of the project.

Market Linkages and Development

Identification of the producers producing and linking with commercial and institutional buyers is an important part of market development. Connecting producer organizations and buyers to the supply chain through the aggregation of service providers is necessary to reduce transaction costs. Small producer organizations require assistance to establish contacts with buyers, appreciate terms of transaction and negotiate contracts with buyers.

Bangladesh being a flat plain, necessitates all three modes of surface transport, i.e., road, railway and water to be widely used in carrying both passengers and cargo. It is estimated that mechanized road transport carry about 70% of the country's total passenger and cargo volume. About 32% of the total area of Bangladesh is effectively covered by the railways.

State-owned Bangladesh Railway operates a track of 2,706 kilometer, owns 643 freight wagons, and provides passenger and cargo services through 502 stations. Inland water transport is the only means available in nearly 10% of the country. The navigable waterways vary between 8,372 kilometers during the monsoon to 5,200 kilometers during the dry season. Bangladesh Inland Water Transport Authority operates four trunk routes (length 633 km), eight link routes (length 1,000 km), 12 secondary routes (length 1,905 km), and seasonal routes (length 2,380 km). The railways and inland waterways network need to be increasingly tapped into to improve livestock business logistics.

Promote Product Diversification

A limited range of meat and dairy products are produced in Bangladesh. Diversification allows for more variety and options for products and services. Not only that it also creates business and employment opportunities. If done properly, diversification provides a tremendous boost to brand image and operating margin. Utilization of by-products can reduce waste and open new sources of revenue. Our field observations in Khulna and Rajshahi show that only 45% of the cow is used for meat, the remaining 55% includes skin, blood, liver, kidney, bones, tendons, meat trimmings, fat or tallow, hides, hooves, horns, internal organs, viscera, and feet which can be utilized for manufacture of various useful products.

Livestock products, milk and meat should be used to produce more varieties of value-added products to create business opportunities. Animal excreta/wastes can be used for several purposes through recycling such as compost, bio-fertilizers, protein/mineral rich animal feeds (e.g. poultry litters), for making and enriching straw-silage etc.

A list of common beef and dairy by-products is presented below.

Table 20: Beef and Milk By-Products

<u>Blood</u> Imitation eggs, Cake mixes, Dyes and inks, Adhesives, Minerals, Medicines, Laboratory materials	<u>Horns & hooves</u> Adhesives, Plastics, Pet food, Plant food, Photo film, Shampoo, Lamination, Wallpaper paste	<u>Fats and fatty acids</u> Chewing gum, Paints, Industrial oil & lubricants, Oleo Margarine, Car and floor wax, Insecticides and herbicides, Tallow for tanning, Pet food, Chicken feed, Hair conditioner and shampoo, Biodegradable detergents, Fabric softener, Hydraulic brake fluid, Deodorant, Shaving cream, Perfume, Cosmetics, Lotions, Crayons, Biodiesel, Plastics
<u>Hair</u> Air filters, Brushes, Felt, Insulation, Plaster, Textiles	<u>Bones</u> Refined sugar, Buttons, Combs, Bone China, Charcoal, Fertilizer	Chalk, Linoleum flooring, Medicines
<u>Hide and hair</u> Gelatin capsules <u>Leather</u> : saddles, foot wear, bags, purse, Hide glue, Rug pads, Ointment base, Flavoring, Artist's brushes	<u>Brain</u> Anti-aging cream Medicine <u>Manure</u> Methane gas, Fertilizer	
<u>Internal organs</u> Instrument strings, Tennis racket strings, Hormones, Enzymes, Vitamins	<u>Dairy products</u> Butter, Cheese, Yoghurt Powdered Milk, Condensed milk, Paneer, Ghee, Flavored milk, Ice Cream	

Improve Efficiency of Supply Chain

To improve the efficiency of supply chain management and create effectiveness, producer organizations need to create and improve predictability, optimize the supply chain costs, reduce, or minimize working capital, do due diligence and risk analysis and have a proper handle on the data. This implies the entire value chain needs to be synced to service the need of the client at the highest speed and minimum cost. Value chains focus downstream on creating value in the eyes of the customer. Customer retention is paramount to reduce cost of customer acquisition.

Bangladesh dairy producers are not globally competitive. The milk price that producers receive is around 37% higher compared to the global average, and even at this level, producers barely meet their costs because of the extremely high cost of feed (about 21% higher than world feed price in August, 2022 shown by IFCN, Germany). Therefore, a means of decreasing the cost of milk production is to decrease feed costs and increase production management efficiency, instead of seeking a higher milk price or higher import tariffs. Raising the tariff will not address the issues of decreasing costs and improving the quality of milk. A higher tariff will have strong adverse effects on consumers and will create less affordable nutrition especially for pregnant women, children and elderly population.

Improve Support Structure and Services for the Sector

Small producers and farmer groups require technical advice and financial support for optimizing production and productivity and developing a market link. The support facilities consist of factors to increase the capabilities of the producers' and farmer organizations' and provide resources and services which have been indicated in the following table (Table 21).

Table 21: Service Providers

Institution	Examples of services provided
Government	Veterinary services Agriculture extension Technical assistance and training Telecommunication Testing labs
Input suppliers	Input supply Market brokerage Logistics
Output sellers	Market information price Transport Warehousing
Financial Institutions	Savings and loans Working capital
Universities, Research Institutes, Extension services	Technical know-how New HYV fodders, and animal breeds
NGOs	Awareness raising campaigns Pilot innovative anti-poverty approaches Highlight gender equality issues Credit facilities
Certification agencies	Certification services

There is gap in market research, food safety, quality and compliance, insurance brokerage, and inclusive value chain wide support which should be addressed to make the value chain more effective.

Improve Enabling Environment

An enabling environment may provide the laws, regulations, and incentives, which assures that the reorientation and transformation towards climate-smart livestock proceeds effectively and sustainably. It helps build institutional capacity at all levels and reduces the risks that deter small producers from investing in new technologies and practices.

A better enabling environment translates into ease of doing business. Bangladesh is ranked 168 among 190 economies in the ease of doing business, according to the latest World Bank annual ratings (World Bank 2020 (b)). Within South Asia, Bangladesh is behind India (77), Bhutan (81), Sri Lanka (100) and Afghanistan (167). Bangladesh has to work for improving the situation after finding out the barriers.

Greater inter-ministerial coordination and dialogue with all market players will improve mutual understanding and collaboration among all stakeholders (Harauchi, 2019). For the private sector to deliver improved growth, Government may put in place:

1. Providing incentives for entrepreneurship and investment;
2. Increasing productivity through competition and innovation;
3. Harnessing international economic linkages through trade and investment; and
4. Improving ease of doing business by providing regulatory certainty and reducing delays in decision making.

According to the OECD's Development Assistance Committee (DAC), these supportive factors are triggered and shaped by Government policies and institutions, including "rules of the game" and mechanisms for their formulation, implementation, and enforcement (OECD, 2007).

Some of the more achievable targets requiring inter-ministerial coordination are:

- **Improving price information in livestock sector:** An improved livestock market information system will enable producers to take right decision to market the commodity and reduce price manipulation by cartels. A necessary step in this direction would be to collect rural weekly price data based on animal quality. Such information, if broadcasted by TV and social media and regularly reported by agriculture extension agents, can help producers make informed choices.
- **Introduce a Separate Livestock Census:** DLS has no mandate to conduct a census. Every 10 years, as part of Agricultural Census, BBS collects data on selected aspects of livestock. Through its extension staff, DLS collects monthly data on milk, meat and egg production, veterinary treatment, vaccination, and Artificial Insemination. However, this data is neither published nor available in the public domain. It is recommended that BBS has a separate Livestock Wing, and conducts a separate livestock census, as envisaged in the Statistical Act, 2013.
- **Better planning for livestock clusters:** There is growing regional imbalance in livestock development. For instance, the livestock farms are concentrated in few pockets of the country. Likewise, modern slaughter houses are concentrated around Dhaka and Chittagong. About 78% of Milk Vita activities are located in Dhaka and Rajshahi division. Sylhet does not have a single Milk Vita chilling unit. Milk collection and chilling plants should be established in all milk producing areas of the country.
- **Strong inter-ministerial coordination:** A Strong inter-ministerial coordination is essential for effective enforcement of existing acts on animal slaughtering, and food

safety; developing well trained manpower engaged in scientific slaughter, processing and meat preservation techniques; extending fiscal and technical support to encourage private investment in feed mills, cold chain, vaccine distribution, veterinary services, and creating a regionally balanced network of milk collection and processing facilities.

- **Coordination between DLS and BLRI:** Coordination between adoptable livestock technology generation by BLRI and other research institutes should be disseminated by DLS at field level. And therefore, the existing coordination between DLS and BLRI should be further strengthened.

Table below presents proposed intervention in the six areas identified to improve the performance of the four value chains.

Table 22: Intervention Areas

Constraints and opportunities	Interventions	Implementing Agency
Area 1: Improve feed price and quality		
Poor quality inputs	Ensure quality control of inputs, especially for processed feed. Update animal feeds standards issued by Animal Feed Act and BSTI. Stamp out adulteration.	Animal Feed Act, BSTI, BFSA, Ministry of Food, Ministry of Industries; Ministry of Commerce
High prices of concentrate feeds	Establish small scale feed mills, introduce certification of quality of feed mills and incentivise cultivation of coarse grains (e.g., Soybean).	Ministry of Industries, MOFL, Ministry of Commerce
Feed resources	Establish Fodder germplasm centre at each Division for multiplication and distribution of seed/cuttings. Cultivation of HYV non-legumes and legume fodders should be encouraged. Preservation of fodders as Hay and Silage be encouraged.	MOFL, BLRI, BAU, DAE, MOA, private sector
Area 2: Market linkages and development		
Lack of small producer-controlled organizations.	Establish FO/PO/social enterprises and marketing cooperatives to participate in aggregation of produce, and sale through multiple market channels.	Department of Cooperatives, Ministry of Local Government, NGO Bureau, MOFL
Limited market channels and dependence on monopolistic milk buyers	Introduce Minimum Support Price (MSP) in milk procurement and distribute through pre-primary schools, hospitals, middle schools, madrasahs, mosques and temples, hospitals, creches, and public food distribution centres	Ministry of Education, and Ministry of Local Government NGOs, Business Associations, MOFL
Infrastructure development	Establish refrigeration facilities and cold storages in milk hubs.	MOFL, Private sector, NGOs
Grant Support	Provide support under sub-grant facilities to private companies to establish milk powder production units.	LDDP, DLS
High freight prices and slow transit process	Identify and address issues to reduce domestic freight price, transport costs, storage, and to ensure seamless transfer of goods from point to point.	Bangladesh Railway and Bangladesh Inland Water Transport Authority, MOFL
Area 3: Promote product diversification		

Constraints and opportunities	Interventions	Implementing Agency
Transfer know-how for new products in dairy and meat processing	Prepare a catalogue of product diversification opportunities and how to do it for MSMEs	DLS
Packaging	Introduce new methods of eco-friendly packaging	BSTI
Live animal fattening	Need for technological upgrading and introduction of fodder cultivation system for lowering feed cost, better weight gain, increased profit margin in beef fattening.	BLRI, BAU, Ministry of Education, Ministry of Local Government NGOs, Business Associations, MOFL
Harmful feed additives	Enforce ban on all feed additives that are harmful to health.	Police Department, Ministry of Home Affairs
Cold chain development	Transfer of advanced technology in areas of grading, cooling, storage, packaging, processing, and transporting	Ministry of Industries, MOFL
Quality certification	Certification of products, and production practices for export markets	Ministry of Commerce
Area 4: Improve the efficiency of supply chain		
Information asymmetry	Enhance cooperation and exchange of information between small producers using mobile voice call and social media.	Ministry of Commerce, MOFL, social media forums
Enhance vaccine production and distribution	Increase the capacity of vaccine production by national laboratories. Distribution system should be improved	MOFL in collaboration with DLS, and private vaccine producers, LGED
Health and disease control	Necessary capacity for disease surveillance, epidemiology, early warning and response and public health activities.	MOFL in collaboration with DLS, and NGOS
Waste management	Development of eco-friendly livestock waste management system	MOFL, MOEF DLS, LGED, and Department of Environment.
Area 5: Improve support structures and service for the sector		
Producers demand more services, information, and support.	Provision of training and information such as: Targeting producers to improve production methods, quality and quantity, Feed manufacturing training, Issuing infographics on climate risk mitigation and adaptation, disease control and market needs.	DLS, MOFE, BLRI, BAU and DAE.
Business Development Services	Improve access to business development services	Bangladesh Bank, major banks and MFIs, PKSF, industry association, private consultants
Upgrade managerial capacity and infrastructure of well-established FOs/POs	Encourage FOs/POs to pool resources and provide services i.e., collection, aggregation, packaging, cooling, storing, and marketing services to members.	BSCIC
Human Resources Development	Mandatory training and registration of all butchers in slaughter houses	LGED, Halal Council, DLS, NGOs
Area 6: Improve the enabling environment		
Inadequate inter departmental	Create multiple task forces having representatives of concerned departments,	MoFL

Constraints and opportunities	Interventions	Implementing Agency
coordination – create multiple forums for dialogue with relevant departments.	producers, private sector, and business associations.	
Implementation of Acts and rules	Strict enforcement of Animal Slaughter and Meat Quality Act, Animal Feed Act and Rules, Bangladesh Animal Product and Quarantine Act, Bangladesh Food Safety Act	MOFL, DLS, BLRI, BSTI, Ministry of Food, Ministry of Agriculture
Capacity development of DLS and BLRI	DLS – preventive and curative veterinary care, AI services up to village level and dissemination of new technologies	MOFL, DLS
Reliable statistical information	Conduct livestock census every 10 years, and make available census report and updates on the Web	DLS, BBS
R&D	BLRI – To ensure production and supply of fodder seeds and cuttings to the farmer. Strengthen capacity for R&D on animal production, disease control, emerging and reemerging infectious disease.	BLRI, BAU and Universities, private companies
Allocation of land to dairy development	All <i>khas</i> lands that are used as communal grazing lands (“bathan”) for cattle and milk production should be reserved for dairy production only.	MOFL, Ministry of Land
Adopt international ESG practices and standards.	Increase knowledge of labor and environmental standards. Organize buyers and sellers to meet every year.	Ministry of Commerce, ESG certification agencies, industry associations

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Annex A: Snapshot of Bangladesh Livestock and Dairy Sector

1. Basic Data	
Population	166 million
Population density per km ²	1252
Poverty & nutrition	20.5% below poverty line in 2019 (\$1.9/day), More than 54% of preschool-age children, equivalent to more than 9.5 million children, are stunted, 56% are underweight and more than 17% are wasted.
Climate	Hot, humid, tropical
Natural disasters	High: prone to regular flooding, storms and cyclone
Topography and soil	Flat, alluvial, very fertile, abundant water 3 rice crops/yr.
GDP	US\$ 324 billion (2020)
Per capita income	US\$ 1969
Agriculture and livestock	Crop-based 12.56% of GDP, livestock 3.4%
Farming system	Mainly subsistence Paddy (rice) Crop-vegetables Paddy-livestock Paddy-fish-livestock small scale dairy
2. Milk Production	
Milk availability	40 to 50 g per day (14–18 kg per year per capita). Milk powder imports 138,000 tonnes in 2018, spending more than US\$ 304 million (2,624 BDT crore) 70% informal market
Milk animal	25.7 million cattle, 0.83 million buffaloes
Smallholder families with milk animals	12 -15 million households
Average milk production (cow)	200-300 per 180-day lactation good milk yield for improved cattle (10-25 kg)
Services	Veterinary and animal husbandry services not adequate. Vet. /Breeding (AI): poor coverage - delivered mainly by Government. Where dairies have set up their own support services systems coverage good. Credit: readily available @ 5-15% pa interest from Banks or @ 16-25% pa interest MFIs.
3. Meat Production	
Meat availability	The per capita meat requirement of Bangladesh is 43.25 kilos, but the availability of it is only 9.12 kilos, indicating an almost 79 percent deficit.
4. Producer Organizations	
Cooperative tier	2-tier structure. Bangladesh Milk Producers Co-operative Union Limited (BIMPUL) operates in six milk shed areas of the country viz Tangail, Manikganj, Tekerhat, Baghabarighat, Rangpur, and Sreenagar. BMPCUL is the central union of a total of 345 Primary Milk Producer's Co-operative Societies and has a membership of about 40,000 milk-producing farmer-members.
5. Market Access	
Size and type	Current milk supply 10.68 million MT valued at US\$ 500 million. Mainly informal Low rural & urban purchasing power. Milk producers relatively close to urban markets
Dairy Enterprises	Since mid-2015, more than 20 investors set up dairy companies, of which 75% use local milk.

Annex B: Institutional Mapping of the Bangladesh Livestock Value Chain

Player/Institution	Potential areas of interest
Government	
Department of Livestock Services	Support & extension
Bangladesh Livestock Research Institute	R&D in genetics, and nutrition
Department of Agriculture	Extension
Food Safety Authority	Food safety
Bangladesh Railways	Transport
Bangladesh Bureau of Statistics	Agricultural census statistics
Universities & Research centres, Extension Services	
Bangladesh Agriculture University	Training of veterinarian, socio-economic research, animal husbandry
Bangabandhu Sheikh Mujibur Rahman Agricultural University	Climate smart agriculture
Business Associations	
Bangladesh Dairy Farmers' Association	Protect interest of domestic producers
World's Poultry Science Association Bangladesh Branch (WPSA-BB)	Knowledge and technology dissemination in the commercial poultry sector.
Enterprises	
Milk vita	VMCCs, and Hubs
BRAC-Aarong	Hubs, product diversification
PRAN	Hubs and product diversification
Trading Corporation of Bangladesh (TCB)	To distribute feed at Upazila level.
Multilateral and bilateral agencies	
FAO	Food security
UNIDO	Sustainable industrialisation and foster innovation
IFAD	Pro-poor livestock development
ADB	Eradicate extreme poverty in Asia
GIZ	Food quality initiative
USAID	USAID builds self-reliance by strengthening Bangladesh's ability to plan, finance and implement its own development solutions
World Bank	Addressing vulnerability to climate change and natural disasters and pivoting towards green growth that support the sustainability of development outcomes for the next generation.
International and National Organisations	
CARE Bangladesh	Sustainable livelihoods
ACDI/VOCA, USA	Livestock production for improved nutrition
Islamic Relief Bangladesh	Rehabilitation of slaughter house in Dhaka
Ashraf Foundation, Jessore	Participator livestock development
People's Development Foundation, Dhaka	Young farmers knowledge and skills in cattle rearing

Annex C: Key Informants Interviewed

Date	Name	Designation	Institutional Affiliation
23.12.21	Gias Ahmed	Director	Dutch-Bangla Dairy
3.1.22	Khondaker Golam Azam	Chief Peoples Officer	Akij Dairy
11.1.22	Dr. Md. Rana Mia	DLO Tangail	DLS
11.1.22	Dr. Md. Golam Mostafa	DLO Natore	DLS
16/1/22	Md. Anisur Rahman	Senior Director	BRAC Enterprises
17/2/22	Md. Mahbub Hassan	General Secretary	World Poultry Science Association - Bangladesh Branch
17/2/22	Md. Abdul Hakim	Manager (Support)	Agro Tools & Solutions
9/3/22	Dr. Shafiqul Islam	Veterinary Public Health Officer	Dhaka South City Corporation (DSCC)
13/3/22	M A Sabur	Chairman	Masco Dairy Enterprise Ltd, Kanchon, Rupgonj, Narayangan
15/3/22	Monir Hossain	GM (Business Head)	EON Poultry Meat Processing Plant, Mouna, Mymensingh
21/3/2022	Nur Mohammed	General Manager	Bengal Meat, Sathia, Pabna
22/3/2022	Maksudur Rahman	DGM (Operations)	PRAN Dairy, Chatmor, Pabna
4/4/2022	Dr. S. M. Jahangir Hossain	Director General	BLRI
15/6/2022	Dr. Biplob K. Roy	CSO - Animal Production	BLRI
23/6/2022	Md. Allauddin	Owner	Sheliadaha Dairy

Annex D1: Focus Group Discussion Questions

For milk value chain

1. How have you been involved in buying and selling milk?
2. Please explain your business cycle.
3. At what price do you sell milk and what price trader sells milk?
4. What are some of the challenges you face in conducting your business viz. say cost of fodder, cost of concentrate, cost of transport?*
5. Of the many problems you face, what is most important to you?
6. What can be done to solve the problems you have listed as important?

For beef fattening value chain

1. How have you been involved in beef fattening trade?
2. Please explain your business cycle.
3. At what price do you sell fattened beef animal?
4. What are some of the challenges you face in conducting your business viz. say cost of fodder, cost of concentrate, cost of transport?
5. Of the many problems you face, what is most important to you?
6. What can be done to solve the problems you have listed as important?

For goat/sheep value chain

1. How have you been involved in the goat/sheep value chain?
2. Please explain your business cycle.
3. At what price do you sell goats/sheep?
4. What are some of the challenges you face in conducting your business viz. say cost of fodder, cost of concentrate, cost of transport?
5. Of the many problems you face, what is most important to you?
6. What can be done to solve the problems you have listed as important?

For duck/Desi Chicken value chain

1. How have you been involved in the duck/Desi Chicken value chain?
2. Please explain your business cycle.
3. At what price do you sell ducks/Desi Chicken?
4. What are some of the challenges you face in conducting your business viz. say cost of fodder, cost of concentrate, cost of transport?
5. Of the many problems you face, what is most important to you?
6. What can be done to solve the problems you have listed as important?

*Check whether the data collected through telephone interview is in accord with what the producers and traders report. Keep a hard copy of the survey sheet with each of the FGD team.

Annex D2: Focus Group Discussion- Milk Value Chain

Date: 03 August 2022

FGD Team Composition: i) Prof. Dr. Md. Ali Akbar- Moderator ii) Prof. Dr. Md. Jasimuddin Khan and Mohd. Abul Kalam Azad – Rapporteur iii) S M A Samad – Logistics

Title: Dairy Producer Group and traders

Venue: Silachar and Kalkini, Madaripur

Purpose of FGD: To collect updated information on dairy animal rearing system

Target group of FGD: Members of milk producer group

No. of participants: 22 – 13 Producers, 7 traders, 2 DLS Officials

Gender of participants: 16 male, 6 female

SI No.	Questions	Answers
01.	How have you been involved in the milk value chain?	Most farmers have inherited the business from their forefathers. They own 3-4 animals. Four of the attendees started dairy animal rearing 3-4 years back with cross bred cows observing the profitable activities of the neighbors.
02.	Please explain your business cycle.	In the early morning they start rearing activities (cleaning, feed preparation, milking etc.). At 7.30 they bring their milk to the local market and sell major portion to the sweet meat shop, tea stall and rest to the consumer at a price of 50 BDT to sweet meat shop and 60 BDT to consumer. From the sale proceeds of milk, they buy concentrate feeds.
03.	At what price do you sell milk?	Regarding production cost they could not give proper information because they do not maintain register book but they told that for desi animal they spend about 50k and 100k BDT and for cross bred animal. Crossbreed cows require concentrated feed costing between 200 to 400 BDT per day. The other rearing cost are not major concern for them. Considering the above statement their production cost ranges between 45 to 48 BDT and selling price ranges between 50 to 60 BDT.
04.	What are some of the challenges you face in conducting your business viz. say cost of food, cost of medicine, cost of transport, others cost?	The main challenges faced by farmers are high feed costs, low price of milk, requirement of large capital outlays for cross bred dairy cows, non-availability of veterinary care, and lack of milk marketing facilities. To the traders, the main challenges are shortage of capital, spoilage of milk, and loss during natural calamities.
05.	Of the many problems you face, what is most important to you?	High price of feedstuffs is the main concern to each and every dairy farmer.
06.	What can be done to solve the problems you have listed as important?	Concentrated feed should be available at government subsidized rates. Most of the farmers are also in the favor of high yielding grass cultivation but they need cuttings availability and training on fodder cultivation. To minimize the feed wastage, they are also interested to have proper training on feeding system.

Overall findings:

For increasing the milk production of the country, the government should take immediate steps to reduce the feed price and increase the milk price. In this connection government may remove all the taxes from importing concentrate feed grains and monitor the animal feed market to ensure reasonable price of feeds. Farmers should be given training on fodder cultivation and it should be practiced throughout the country. The milk traders/'goalas' should be given short training on hygienic milk collection and preservation. Financial organizations may be asked to arrange soft loans for the milk traders.

Conclusion:

Milk trade is becoming unviable for very small producers, particularly if they feed the animals with concentrates.



FGD with dairy farmers



Meeting with livestock service providers



Milk trader ('goala') carrying milk on a cart



Meeting with milk traders

Annex D3: Focus Group Discussion- Beef Fattening

Date: 02 August 2022

FGD Team Composition: i) Prof. Dr. Md. Ali Akbar- Moderator ii) Prof. Dr. Md. Jasimuddin Khan and Mohd. Abul Kalam Azad – Rapporteur iii) S M A Samad – Logistics

Title: Dairy Producer Group and traders

Venue: Durgapur, Gopalganj Sador Upazila, Gopalganj

Purpose of FGD: To collect information on beef fattening trade

Target group of FGD: Beef fattening producers and traders

No. of participants: 28 – 14 Producers, 7 traders, 7 DLS Officials

Gender of participants: 18 male, 10 female

Sl. No.	Questions	Answers
01.	How many years have you been involved in Beef Fattening Trade?	Most of the producers have been plying their trade for 10-15 years, mostly ancestral adaptation. New entrepreneurs are also coming in this business attracted by the prospect of quick money.
02.	Pls. explain your business cycle	There are 3 short cycles for beef fattening aimed at Eid al-Fitr earlier in the year, Eid al-Adha later in the year, and marriage season in the winter. Producers buy 6-month-old bovines, rear for 5-6 months and then sell either directly to a consumer, or to a trader/butcher.
03.	What price do you sale fattened beef animal?	The purchase price of 6 months old bovines is 60,000 BDT which fetches on an average 90,000 to 115,000 BDT after 6 months of rearing.
04.	What are some of the challenges you face in conducting your business?	There are lot of constraints related to excessive feed cost; outbreak of lumpy skin disease; and shortage of mechanical means of transport.
05.	Of the many problems you face, what is the most important to you?	The high price of concentrate as well as straw is the most important problem.
06.	What can be done to solve the problems you have listed as important	✓ Use of total mixed ration and silage may be unique tool to lessen the feed cost around the year. ✓ Need livestock extension services from the ULO, DLS as and when needed basis. ✓ Availability of routine vaccines, deworming and treatment facilities. ✓ Need credit support for increasing the business volume around the year, etc.

Overall findings :

Beef fattening is well established as a viable business. Many educated entrepreneurs are taking up this venture in a big way.

Conclusion:

High cost of concentrates is reducing the profit margin. For minimizing feed cost, TMR and silage technology might be useful. Beef fattening farmers are also expecting soft loans from banks.

	
Map of Gopalganj	FGD on Beef Fattening at Gopalganj Sadar Upazila, Gopalganj District, Bangladesh

Annex D4: Focus Group Discussion – Goat Keepers

Date: 22 June 2022

FGD team composition: Dr Manab Chakraborty, Moderator; Md. Rezaul Karim, Rapporteur; Md. Mostafa Kamal, Logistic Support

Title: Gafforpur Goat producer group,

Venue: Residence of Ms. Farida, Gofforpur, Meherpur sadar, District: Meherpur

Purpose of FGD: Validation of data collected from Telephonic Survey

Target group of FGD: Members of goat producer group

No of participants: Total: 14 - Producers; 11, Traders 0; DLS officials: 03 , others 0

Gender of participants: Total 14 - Male: 04; Female 11. Others: 0.

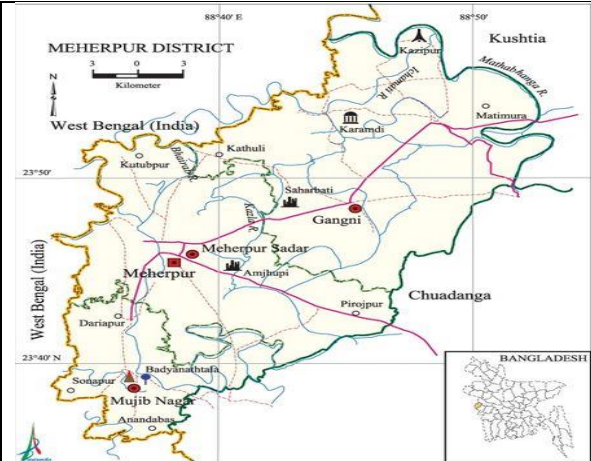
Questions	Answers
1. How have you been involved in the goat value chain?	Due to high fecundity, rearers can obtain more kids (4 to 6 kids) in a year. Many offspring from a doe assures satisfactory return from goats. Goats can be managed by women and children; thus, external labour cost is zero. Goats give subsistence income and cash during emergency. Women have got the sole ownership of the income of goat.
2. Please explain your business cycle.	Offspring (Kids of goat) are future asset. Rearers sell castrated goat for meat purpose with prime targeting Eid ul Azha (Kurbani) market. Female kids are nourished for reproduction. Rearers usually maintain goat stock; occasionally buying from neighbours to increase stock.
3. At what price do you sell goats?	Goat sale price varies from 6000 to 15000 BDT depending on age, sex, size, body weight, future use of sold goat.
4. What are some of the challenges you face in conducting your business?	• Due to lack of sufficient space rearers can keep only 8 to 15 goats although some of the rearers intend to keep more goats if better housing is secured. • Very few have raised platforms to keep goats away from their droppings. • High price of concentrates.
5. Of the many problems you face, what is most important to you?	• Rainy season and winter cause problem as goats susceptible to some of the alimentary and respiratory diseases in rainy season and in winter. • During rainy season, goats can't scavenge due to waterlogging.
6. What can be done to solve the problems you have listed as important?	• Better housing for goats and raised platforms. • Regular cleaning of platforms. • Special care during rainy and winter seasons.

Overall Findings:

Local DLS officials were found very alert and responsive to the problems of goat keepers. There is no shortage of PPR vaccination. Group members are enthusiastic and efficient in managing goats which provide them satisfactory return. Farmers do not have to pay transport costs as for selling goats as traders reach to goat farm for buying animal

Conclusion:

As women possess the sole ownership from goat income, thus goat rearing can be a tool for raising voices of women, women empowerment and development.

	
Map of Meherpur district	FGD Participants
	
FGD Facilitation	Visit to weekly goat market Baridi, Meherpur

Annex D5: Focus Group Discussion - Sheep

Date: 27 June 2022

FGD team composition: Dr Manab Chakraborty, Moderator; Md. Mirza Altaf Hussain, Rapporteur; Md. SMA Samad, Logistics Support

Title: Musapur Sheep producer group,

Venue: Residence of Ms. Nasmza Nahar, Musafurpur village, Companiganj, Dt. Noakhali.

Purpose of FGD: Validation of data collected from field survey

Target group of FGD: Members of sheep producer group

No of participants: Total: 15 - Producers 10, Traders 0; DLS officials: 05, others 0

Gender of participants: Total 15 - Male: 04; Female 11. Others: 0.

Questions	Answers
1. How have you been involved in the sheep value chain?	Most of the sheep farmers in Musapur keep sheep as their family tradition and the sheep variety was Bangladeshi coastal sheep. But, all categories of farmers (landless, marginal, small, medium and large farm families) had higher number of sheep compared to goat and cattle in some selected sheep populated coastal areas (Companiganj, Subarnachar and Kobirhat upazilla) of Noakhali district in Bangladesh. Sheep are mainly kept for meat purpose in Noakhali char area, coastal belt and villages. The Musafur sheep producer group has 30 all women members.
2. Please explain your business cycle.	Sheep are raised both at homestead and Bathans. The Bathans are khas or public land found in haor basin or newly formed chars. After the monsoon, thousands of buffalo, cattle, and sheep move to Bathans. Meat and wool are the main products of sheep. Temporary bathan settlements are formed in the winter (October – April) in haor beds, and dismantled when the monsoon comes (May-September). Often several households would get together to entrust their animals to a herder. The holding size of animals per household range between 9 and 40. Sheep stock are sold after 6-8 months of rearing. Within the Musafur sheep producer group, yearly return from sheep sale varied between 83461 to 15128 BDT per year/farm.
3. At what price do you sell sheep?	After 6 months, individual sheep are sold at 10,000 BDT. Older sheep fetch 15,000 BDT.
4. What are some of the challenges you face in conducting your business?	• Attack by feral dogs on small animals is a growing problem. • Since sheep feed directly from the ground, gastrointestinal worms including roundworms, stomach worms, and nematodes are common in the sheep population that causes serious anaemia. Other types of internal parasites of sheep include tapeworms, lungworms, liver flukes, and meningeal worms, though all of these are far less common than gastrointestinal worms. • Salt poisoning in livestock especially in coastal area is due to tidal upsurge which caused huge mortality. Acute salt poisoning has happened in sheep, Noakhali coastal area. Serum electrolytes imbalance in sheep caused from acute salt toxicity. • Loss of Baithan land to permanent settlement by the Army, tourist resorts, and land encroachers is reducing grazing area.
5. Of the many problems you face, what is most important to you?	Lack of PPR vaccine and attack by feral dogs are cited as major problems.

Questions	Answers
6. What can be done to solve the problems you have listed as important?	- DLS must make PPR vaccine available on time and in adequate quantity. - Use natural herbs for deworming of sheep. - Feral dogs may be eliminated.

Overall Findings:

The producer group has excellent relationship with DLS/LDDP team. The group do not have any problem in selling sheep as there is strong demand for sheep meat in local market. The groups do not face any problems of fodder or marketing of the live animals. Together Nasmuza Nahar (President, 36), Khotiza Khatun (Secretary, 35), and Taslima Akhter (Treasurer, 40) form a strong team.

Conclusion:

DLS/LDDP staff under the leadership of Dr. Taslima Ferdousi, ULO and Md. Anwar, LSP are nurturing the producer group with lot of care and attention. The groups will require further training in nature-based deworming. DLS/LDDP may consider constructing some model shelters in Baithan and also in Musafur homestead to offer dry beds for sheep to rest and reproduce.



FDG in Action



Sheep in Baithan. Courtesy: Mizanur, LDDP Companiganj



Producer Group members



With LDDP Companiganj Upazila Staff

Annex D6: Focus Group Discussion - Backyard Chicken

Date: 28 June 2022

FGD team composition: Md. SMA Samad, Moderator and Logistics Support; Dr Manab Chakraborty and Md. Mirza Altaf Hussain, Rapporteurs.

Title: Ashwadiha Paribarik Murgi Utpadan Dal (Aswadiha Chicken Producer Group),

Venue: Residence of Ms. Selina Akhtar, Village Olipur, Noakhali Sadar Upazila, District: Noakhali

Purpose of FGD: Validation of data collected from field survey

Target group of FGD: Members of backyard chicken producer group

No of participants: Total: 15 - Producers 10, Traders 0, DLS officials: 05, others 0

Gender of participants: Total 10 - Male: 5; Female 10, Others : 0.

Questions	Answers
1. How have you been involved in the chicken value chain?	The group has 30 members. All of the producer group members have been raising chickens since their childhood. They continued the practice even after marriage. The current group came into existence about 6 months back, at the initiative of Dr. Goutam Das, ULO.
2. Please explain your business cycle.	Chicken is hatched at home, and fed with a mixed ratio of rice, corn, legumes, and a small portion of concentrates. The chicks are raised for 2-3 months and sold to village trader. The eggs are partly consumed at home, and sold to neighbours and traders. The folk size varies between 15-40 birds among group members.
3. At what price do you sell eggs and chicken?	Eggs are sold at 10-11 taka a piece. Chicken is sold by weight. The current price is 450/kg.
4. What are some of the challenges you face in conducting your business?	• Ranikhet or Newcastle disease (NCD) is the most economically severe disease. • Currently, the chicks are laying 110-120 eggs, the women are interested to increase productivity through feed and care. • Future expansion of the folk will require larger, well designed chicken sheds.
5. Of the many problems you face, what is most important to you?	• Controlling NCD.
6. What can be done to solve the problems you have listed as important?	• NCD can only be prevented by giving your chickens. DLS may widely administer NCD B1B1 and NCD Lasota vaccines. • DLS may set up few model chicken sheds for 500-1000 Desi chicken.

Overall Findings:

The group members are enthusiastic about their trade. They are eagerly awaiting training in scientific poultry management from DLS. The leadership team comprising of Rashida Begum (45), President; Jasmin Akhtar (32), Secretary, and Selina Akhtar (33) is mature and sharp.

Conclusion:

This producer group could be linked with traders in Noakhali town who sell country chicken.



FGD with backyard poultry keepers



Meeting with poultry traders conducted by Dr. Kazi Rafikuzzaman, DLO, Noakhali

Annex D7: Focus Group Discussion - Backyard Ducks

Date: 3 July 2022

FGD team composition: Dr. Prasun Kumar Das, Moderator; Md. Rezaul Karim, Rapporteur; Md. Mostafa Kamal, Logistic Support

Title: Shachail Duck Producer Group

Venue: Residence of Ms. Alpana, Village Shachail, Upazila- Tarail District- Kishoreganj.

Purpose of FGD: Validation of data collected from telephone survey

Target group of FGD: Members of duck producer group

No of participants: Total: 12 - Producers 10, Traders 0; DLS officials: 02, others 0

Gender of participants: Total 12 - Male: 05; Female 7, Others: 0.

Questions	Answers
1. How have you been involved in the Duck value chain?	Substantial number of waterbodies in the area provides natural feed resources for ducks encourages farmers for creating parts of livelihoods from duck production and business. Adequate supply of Day-Old Ducklings (DOD) is available as some farmers have chosen duck egg hatching enterprises using indigenous rice husk incubation. The duck incubation period is between 28 days in summer to 36 days in winter and does vary depending on the breed of duck. Moreover, duck eggs and live birds are in great demand round the year. Both male and female members of the family are involved in DOD rearing to marketing.
2. Please explain your business cycle.	Farmers rear DOD egg and meat production. Farmers produce 'Hatching egg' and 'Table egg'. Local hatcheries buy off both type of eggs from the producers. Some farmers raise young, adolescent layers (called pullets). Other producers buy the pullets at door step. In Kishoreganj, ducks are reared up to 10 to 15 weeks of age. Selling ducks or eggs do not face any marketing challenge; traders and hatcheries visit homes for direct procurement; producers also sell their wares in local market.
3. At what price do you sell duck and duck eggs?	Present egg sale price: Hatching egg 12 BDT per egg, Table egg 10 BDT per egg. Live duck sale at 300 to 350 BDT per Kg. Price is not fixed, it varies depending on demand, availability, season.
4. What are some of the challenges you face in conducting your business?	- DLS is not adequately equipped with medicine to combat to reduce duck disease outbreak and mortality. - Vaccination coverage for duck Cholera from DLS is not satisfactory. - Duck farmers are prohibited from use of water bodies if the same is leased for raising fish. This causes higher purchase of concentrated feed. - The price of concentrate feed is high and rising.

Questions	Answers
5. Of the many problems you face, what is most important to you?	- Inadequate availability of Duck Cholera vaccine and medicines from DLS. - Restrictions on use of waterbodies leased for fish farming.
6. What can be done to solve the problems you have listed as important?	- Better support from DLS on supply of medicine, vaccines, and advice on better management and production of ducks. - Nets be used to guard fish fingerlings and restrain ducks from entering netted area.

Overall Findings:

Local DLS officials were found responsive to the needs of the farmers. ULO, Tarail mentioned that due to very limited supply of Duck Cholera Vaccine they could not organize mass vaccination program for preventing Duck Cholera. During the trip, the FGD team met Dr. Md. Nazrul Islam, DLO Kishoreganj. He mentioned that about 26% of the total Duck eggs supplied in the country are produced in Kishoreganj district. He also mentioned that about 14,20,000 DOD are produced in Kishoreganj per month through farmers initiatives.

74 Duck hatcheries have been established in Karimganj and Tarail upazilas of Kishoreganj district, who use rice husk Incubators for hatching. Besides these, the Government Duck farm in Kishoreganj had a modern hatchery capacity, of which can produce 28,000 DOD per month.

Conclusion:

DLS may organise campaigns to spread messages on improved duck rearing practices and use of alternatives to concentrated feed.



FGD with duck producers at Train, Kishoreganj



Ducks swimming in a waterbody at Tarail



FGD team interaction with a small duck trader at a weekly market Nilganj, Tarail Kishoreganj



Box for hatching of duck eggs