Sub-Sector Assessment of Dairy

A Report on Dairy (Milk & Meat) Value Chain Selection & Analysis

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Rural Microenterprise
Transformation Project (RMTP)

'**Sub-Sector Assessment of Dairy'** is a market assessment document of the Dairy sub-sector project "Rural Microenterprise Transformation Project (RMTP)". It is prepared for Gram Unnayan Karma (GUK), jointly funded by Palli Karma-Sahayak Foundation (PKSF) and the International Fund for Agricultural Development (IFAD). GMark Consulting Limited (www.gmark-bd.com) conducted the sub-sector assessment that includes value chain selection and analysis. GMark is a Market Systems Project Management specialty firm that offers services across project management, market research, evaluation, capacity building and sustainable business development.

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01 INTRODUCTION

01. Introduction

Agriculture is one of the most important sector of Bangladeshi economy and livestock is an important sub-sector for the development of agricultural growth. It is a promising sector for poverty reduction. The sector can also help to reduce malnutrition problem for the people in Bangladesh. 20% direct and 50% partly employment has been created by livestock sector. Contribution of livestock in the country's GDP is 1.06 percent. The milk and meat play significant role to provide a major portion of the animal protein in our daily diet. Though the production of milk and meat increased over the last five years, Bangladesh is still running with a shortage of its required amount of animal protein.

PKSF implements a project titled "Rural Microenterprise Transformation Project (RMTP)" that aims to improve the value chain performance of various agricultural sub-sector. Gram Unnayan Kendra (GUK) is an implementing partner of PKSF's RMTP project. GUK was selected to implement a Value Chain Development project on "Market System Development of Safe Meat and Dairy Products", a BDT 490 Million project to be implemented in the selected upazillas and unions of Bogra district.

As part of the strengthening the dairy value chain in Bogra, GUK commissioned a value chain analysis or sub-sector assessment on dairy to GMark Consulting Limited to identify the root causes of constraints and major opportunities for the chain's development. The idea is to identify market-centric solutions in the dairy sub-sector those could provide sustainable development solutions to increase access to essential dairy inputs and services, improve the market linkage opportunities in improving branding and marketing techniques, packaging solutions and product standardization and certification.

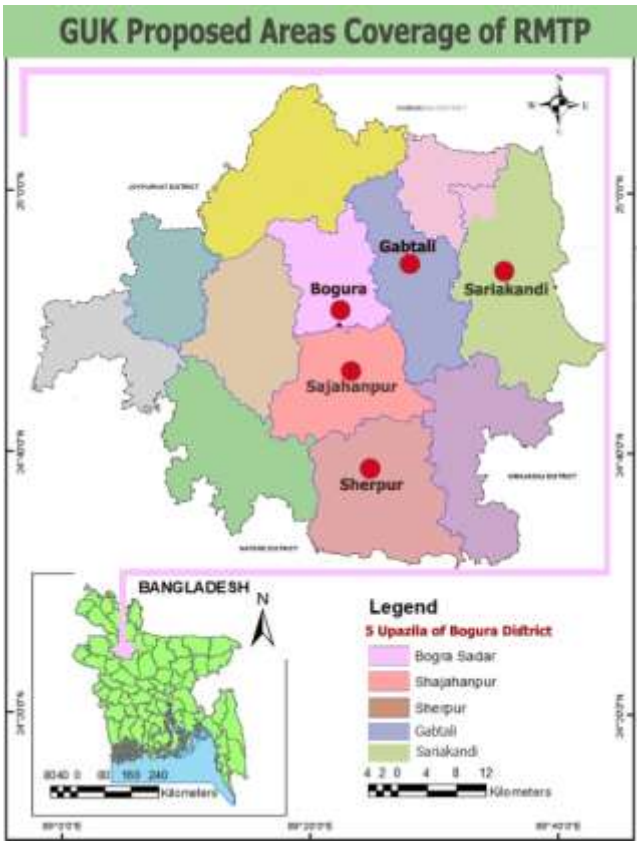
Objectives of the Dairy Sub-Sector Assessment

The assessment has met the following objectives:

(a) Provided insights on key value chain activities (process step mapping of the dairy value chain; availability of assets and tools for each production step and identify gaps; knowledge need and current situation of each step/actor in the value chain and identify gaps; relationship among key actors in the value chain),
(b) Provided insights on business development services (existing business development services/ service provision for small scale dairy producers; role of the private and public sectors support in the dairy value chain; current level capacity of producers, developing business cases),
(c) Conducted financial analysis of the sector (need for working capital at different level; cost and revenue drivers for farmers and processors; monetary flow in value chain),
(d) Collected insights and impacts of macro and micro environmental factors (market characteristics; policy issues in micro and macro level in dairy sector; potential socio-economic and environmental impact of a dairy value chain development project in the area),
(e) Identified the systemic constraints and opportunities i.e. market linkage scope, market size and market requirement for linkage etc.
(f) Developed a set of recommendation or way forward to improve market outcomes to foster pro-poor growth of dairy value chains.

Geographical Scope

The assessment was conducted in five (5) upazillas of Bogra district. In total 18 unions were selected to collect information from the respondents involved in dairy sub-sector. The assessment was done for both milk value chain actors and meat value chain actors and participants were found involved in rearing cow mostly followed by goat, buffalo and sheep.



Following are the five (5) upazillas that represent the project's working area.

1. Bogura Sadar
2. Shajahanpur
3. Sherpur
4. Gabtali
5. Sariakandi

02 METHODOLOGY

02. Methodology

The sub-sector assessment applied a bespoke framework that was created to analyze a value chain and its common pattern that mixes information to enable ongoing value chain situation and the empirical understanding of the meat and dairy value chain. The analysis brings together functional, market and economic analysis of the entire value chain (from producers to end consumers), informed by theory and current practice.

This integrated approach is intended to inform thoughtful donor and private sector investments in the meat and dairy value chain that go beyond sparking upgrading by more powerful, ready-to-go market actors. Findings from the assessment will an informed transition, which is more inclusive and equitable to the meat and dairy value chain.

Sampling Framework

Selection of the Participants

The sub-sector assessment focuses on meat and dairy culture in the northwest of Bangladesh. The target area of the project consists of five upazillas in Bogra district. A wide range of species (cow and goat) are reared in the project location and sold in rural and urban markets inside and outside of the district. The primary target population of the project is small-scale dairy and meat producers. The sub-sector assessment included all other market actors (i.e., input sellers, processors, buyers) including the support service providers and business enablers.

The study applied a stratified random sampling method to obtain a sample population that best represents the entire population being studied. It covered 5 percent of the total population size (those involved in meat and dairy value chain) dividing them into homogenous groups such as the producers, feed retailers, medicine retailers, milk collectors, govt. officials etc.

Survey Methods

The sub-sector assessment used primary data combined with some secondary data, mainly livestock statistics from the Department of Livestock Service (DLS). Collection of primary data involved consecutive mixed methods: Focus Group Discussion (FGD), Individual Interview (II), Key Informant Interview (KII) and Data Validation Workshop (VW). The sub-sector assessment followed collection of high level of qualitative information backed up by some quantitative information collected from the Individual Interview.

Snowball Approach

Samples were drawn following *Judgmental Sampling Method*[1] to select units to be sampled based on the knowledge and professional judgment. The sub-sector assessment took a "Snowball Approach[2]" to identify participants' location and interview them. At the time of sampling, the assessment considered the period allocated for conducting the sub-sector analysis.

Data Collection Methods

(a) ***Desk Research:*** To gather primary data (quantitative and qualitative) about each the region and national livestock activities, production and other economic scenario, data have been collected and reviewed through desk research to create a primary picture of the economic activities of the livestock and dairy producers. Articles and statistics published by the Bangladesh Bureau of Statistics, Department of Agricultural Extension and Department of Livestock Services etc. were analyzed to complement the field findings.

(b) ***Focus Group Discussion (FGD):*** Various producers of livestock and dairy sub-sectors were interviewed through FGDs to get an illustrative picture on present livestock production, post-harvest, processing and marketing practices. About 15-20 producers participated in each FGD. Producers also responded on existing challenges and prospects related to the dairy milk and meat production.

(c) ***Individual interview (II):*** The sub-sector assessment took individual interviews with 13 service providers, 6 fodder sellers, 3 dairy producers, 3 milk collectors, 3 feed suppliers, 4 seed sellers, 3 local dairy processors (sweetmeat makers), 3 cow buyers, 6 restaurant owners, 2 labors and 3 transport service providers. The purpose of the IIs were to understand market actor wise or function wise scenario and identify the root causes to various constraints identified or highlighted by the producers during the FGDs.

(d) ***Key Informant Interview (KII):*** Key Informants usually referred to those people who have in-depth knowledge about a particular sector or area. In this case, one-to-one discussion were made gather specific information and insights of the livestock economic activities in the surveyed regions. The key informants were official from 3 medicine companies, 2 chilling plants, 3 certification agencies, 1 local association, 3 machinery suppliers and 2 feed companies. Other than these informants, the assessment also make interviews with govt. officials such as local DLS, Youth Development Centers, institutional buyers, Haat-Bazar Committee, and other input companies.

(e) ***Validation Workshop:*** A stakeholder validation workshop was conducted with key dairy sub-sector market actors and govt. officials to validate information collected through other means. This also help to provide rationale for selection of dairy milk and meat sub-sectors from Bogra.

[1] It is a non-probability sampling technique where the researcher selects units to be sampled based on own existing knowledge, or professional judgment.

[2] A recruitment technique in which research participants are asked to assist researchers in identifying other potential subjects.

Respondent Sampling

To gain an in-depth understanding on the meat and dairy value chain specifically in the project location, and its constraints and opportunities, the study aimed to capture a diversity of views across the sub-sector (practices, trends, challenges, factors and their influences) while being efficient to link between them. Therefore, the sub-sector assessment used a two-fold linked approach:

1. Market actors of different types were selected and interviewed.
2. The study followed the value chain backward and forward by selecting and interviewing input market actors, forward market actors (for example, dairy and meat processors that those producers sold their produces to) and service providers (DLS, AI etc.).

Because of the linked approach, and because participants were selected randomly, it is assumed that the market actors in the subsequent stages are also representative of the whole population and the findings are common and accurate for them.

SL	Types of Actors	Sample Interviewed	Methods
1.	Dairy Milk Producer	77	FGD
2.	Meat Producer		FGD
3.	AI Technician	6	II
4.	LSP	7	
5.	Feed Supplier (Dealer/retailer0	5	
6.	Medicine Seller	5	
7.	Fodder Supplier	18	
8.	Bull Supplier (for fattening)	15	
9.	Equipment Supplier	1	
10.	Govt. Official (ULO, DLO)	6	
11.	Input Company	6	
12.	Milkmen (Gowala)	22	
13.	Milk Collector	10	
14.	Transport Service Provider	5	
15.	Chilling Plant Owner	3	
16.	Dairy Processor (Yogurt)	25	
17.	Dairy Processor (Sweetmeat)	15	
18.	Dairy Processor (Ghee)	10	
19.	Retail Shop (Tea-stall)	25	
20.	Retail Shop (Bakery)	8	
21.	Butcher	7	
22.	Restaurant	7	
23.	Online Shop	2	
24.	Certification Agency	1	
Total			

Sub-sector Selection Approach

After reviewing and interviewing, the assessment team analyzed the findings to select potential value chain(s) or sub-sector(s) that are prospective and opportunistic for RMTP project beneficiaries. *Value Chain Selection Matrix* (VCSM) was the fundamental basis of scoping. The assessment team applied two (2) Selection Matrix during the assessment. The first one was the "Product Identification Matrix" and the second one is used the "Shortlisting Matrix".

Step 1: Determine Criteria
RMTP project focuses on value chain development of different potential high-value and nutrition-sensitive agricultural products. The project implements value chain interventions in the areas where poverty incidence is high. The product or sub-sector or value chain were therefore selected based on market size, profitability, growth potentials, seasonality, market competitiveness, employment, the participation of women & youth, and so on. The project followed a systematic process of product selection and analysis of its entire value chain.

Criteria that are considered during the product identification were as follows.

(1) Number of households involved in the value chain
(2) No of poor households involved in the value chain
(3) Involvement of Male and Female (Ratio)
(4) Ownership of land for production (own land/ lease land)
(5) Opportunity for year round production
(6) Profitability/ Income potential
(7) Potential for Market Growth/Market Viability/ Linkage Opportunity (local, regional and national)
(8) Vulnerability to climate change

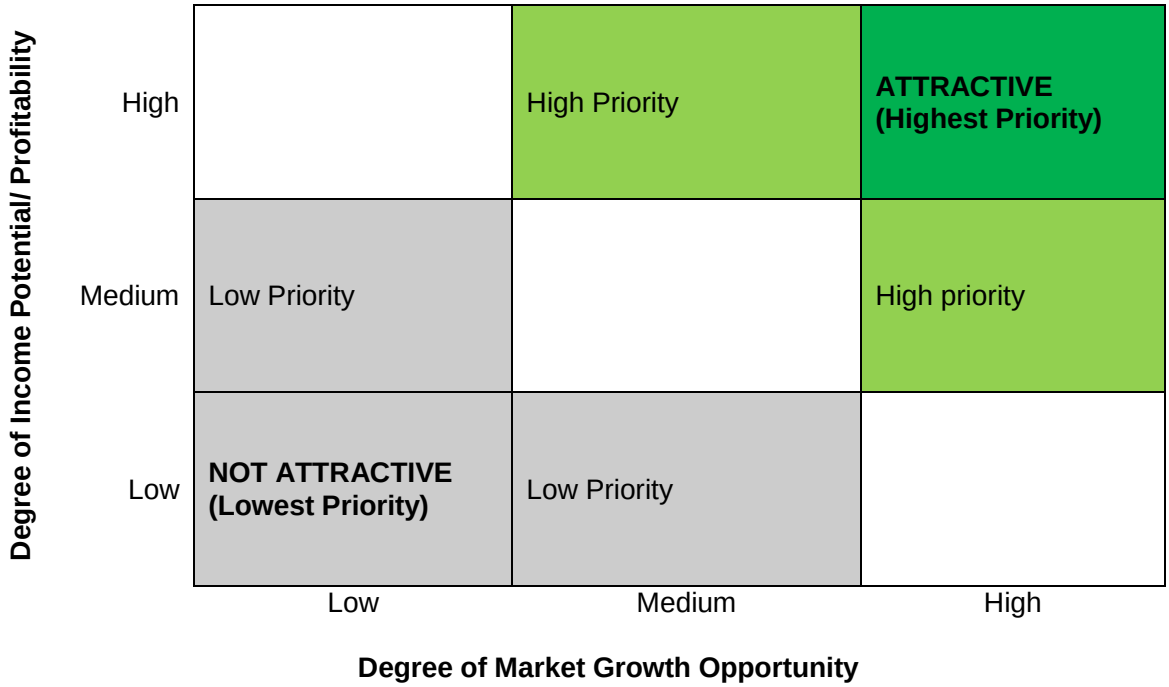
Step 2: Weighting of Criteria
All the selected criteria were considered by giving equal importance in the decision of what value chains to analyze. Some criteria were considered to have a higher level of importance in the decision making process and emphasis on "pro-poor" characteristics and therefore had a greater influence on the ranking of value chains. Weighting is assigned in two common ways-

1) Simple numeric assignment- provide numeric value for example, 1, 2, 3 or 4 - where the relative importance of criteria is in direct proportion to the numeric weighting.
2) Proportional assignment - where all of the criteria utilized are judged to have a combined weighting of 100 percent, and the relative importance of each criteria is reflected in the proportion of the total weighting that is assigned to that criteria.

Step 3: Listing and scoring of potential value chain
Once the criteria for selection of value chain for analysis are identified and weightage are given, the next step is to determine a list of all the potential value chains that were considered in the regions for in-depth assessment. This identification is based on products that are already produced in the area, products with technically feasible to produce in the area, have a pro-poor focus, more people involved with the products, or products that are judged to have a good market potential (local, regional, national or international market).

Step 4: Short listing

All the potential value chains were then put in a three by three (3x3) matrix where the degree is categorized into three (03) levels – Low, Medium and High. Potential high-value agricultural products are selected based on two major criteria 0 1) profitability and 2) growth potentials. The profitability is usually measured by the ratio of the production cost and sales price. The market size is usually determined by annual sales volume. The market trend of the products is also analyzed to support the ranking.



In the shortlisting matrix, the top right area (most attractive and highest priority) indicates that the products are both highly profitable and have larger markets or growth potential. Hence, these products can be considered as most promising for Value Chain or Market Development interventions. Some products may have comparatively lower market size but they can be highly profitable. Considering the future growth potential, the products/produces/value chains can also be selected.

Sub-sector/ Value Chain Analysis Approach

Once the potential product is selected, the value chain analysis starts. At first, the basic information of the market, production, input market, and other actors were collected from secondary sources such as the internet, publication, newspaper, research paper, and so on. Based on that information, a primary market map of the selected product was drawn. The value chain map/market map was then updated with information and analysis received after discussing it with the respective stakeholders/market actors.

Key questions asked (but not limited to) during the sub-sector assessment were as follows.

a. What are the core processes in the value chain?
b. Who are the actors involved in these processes and what do they do?
c. What are the flows of product, information, and knowledge in the value chain?
d. What are the volume of products, the number of actors, and jobs?
e. Where does the product (or service) originate from and where does it go?
f. How does the value change along the chain?
g. What types of relationships and linkages exist?
h. What types of services are feeding into the chain?
i. What is the location and position of the poor in the value chain?
j. What key constraints exist at various levels in the chain and what are potential solutions to those constraints?
k. How do products, information, and knowledge flow through the value chain?

Data Analysis

The analysis of data consisted of three types using the following qualitative and quantitative methods:

Functional analysis: This provides a general mapping and description of the core market actors, activities and operations in the dairy and meat value chain. It also includes an overview of the products and product flows, the major production systems, a description of the main governance mechanisms in the chain, and a short description of known constraints. The functional analysis formed the basis for the analyses in the other components.

Economic analysis: This consists of a financial analysis of producers (financial accounts, return on investment, profitability etc.), as well as an assessment of the consolidated value chain (value of production, extrapolation for the sector). It also assessed the inclusiveness of the chain by examining income distribution (income, wages, margin), and employment creation and distribution.

Social and gender analysis: This explores whether the meat and dairy value chain is inclusive and where different types of actors sit within the value chain. It delves into equity and power issues among these different value chain actors, including gender. It further looks into equitable access of inputs, output market, information and services, and the social and economic upgrading strategies of these actors as they deal with various opportunities and constraints along the value chain, including social and gender norms.

In carrying out the analysis, to create holistic insights useful for “systems change” interventions, these elements are not addressed discreetly, but rather in an integrated way in the results, analysis and recommendations of this study.

Limitations of the Sub-Sector Assessment

Despite its successful completion, the accuracy of information collected is tainted by possibilities and instances of erroneous data streaming from a lack of cross-verification or data-validation, owing to time limitations.

Secondly, due to inconsistencies or lack of the respondents' written records or logs, in many cases, respondents tended to provide arbitrary answers particularly to historical questions (like income, price of different products over different seasons, production volumes etc.) or generalized questions (such as, production techniques, common diseases etc.). In order to mitigate these inconsistencies, some series of clarifying questions were initiated to cross check ambiguous responses, and some answers recorded may at times reflect generalizations or subjective judgment of the interviewers.

Finally, over the duration of the group interview sessions, the attendance of the participants withered due to obligations on their farms, or other duties of their daily lives and livelihoods, and some ended up leaving the sessions or opting out over its course. As such, parts of the data gathered for this study may not be directly relevant to all respondents.

However, to counter these inconsistencies as much as possible, the data has been crosschecked and validated with local knowledge and information available with other survey reports of the same.

03 SUB-SECTOR SELECTION

03. Sub-Sector Selection

Product Identification Matrix

SL	Value Chain or Product Produced in the area	Number of households involved	No of poor households involved	Involvement of Male, Female & Youth (%)			Ownership of land for production (%)		Opportunity for year round production	Profitability	Potential for Market Growth			Vulnerability to climate change
				Male	Female	Youth	Own Land	Lease Land			Local	Regional	National	
1.	Dairy Cow (Milk & Meat)	14,255	8,553	55	35	10	60	40	YES	HIGH	HIGH	HIGH	HIGH	MEDIUM
2.	Chili & Spice	8,990	3,596	40	50	10	40	60	YES	HIGH	MEDIUM	MEDIUM	HIGH	MEDIUM
3.	Fisheries	6,520	1,956	20	65	15	20	80	YES	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
4.	Buffalo (Milk & Meat)	6,254	1,251	10	80	10	60	40	YES	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM
5.	Goat	6,195	3,717	60	25	15	30	70	YES	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
6.	Rice	6,250	1,875	5	85	10	30	70	YES	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
7.	Chicken & Duck	5,870	3,522	70	10	20	40	60	YES	HIGH	HIGH	HIGH	HIGH	MEDIUM
8.	Vegetable	5,265	2,106	60	30	10	50	50	YES	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
9.	Sheep	3,256	1,954	50	40	10	20	80	YES	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM
10.	Potato & Pulse	2,536	1,522	10	80	10	40	60	YES	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
11.	Groundnut	3,560	2,136	5	80	15	40	60	YES	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM

In the above table, the dairy sub-sector assessment identified 11 different on-farm value chains or products produced in the project location. Among them, four (4) falls under the dairy sub-sector; these ate Cow, Buffalo, Goat and Sheep. The assessment team collected similar information for all the 11 identified sub-sectors or value chains in accordance to the pre-determined criteria.

Information were then analyzed for ranking by using the weightage matrix.

Value Chain		Dairy Cow (Milk & Meat)		Chili & Spice		Fisheries		Buffalo (Milk & Meat)		Goat		Rice		Chicken & Duck		Vegetable		Sheep		Potato & Pulse		Groundnut	
Criteria	Weight (%)	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score	Score (1-10)	Weighted Score
Number of households involved	10	9	90	7	70	6	60	7	70	7	70	6	60	5	50	3	30	4	40	3	30	3	30
No of poor households involved	10	8	80	6	60	3	30	3	30	7	70	2	20	4	40	3	30	2	20	2	20	2	20
Involvement of Male, Female & Youth	10	5	50	6	60	3	30	5	50	5	50	6	60	3	30	3	30	4	40	5	50	5	50
Ownership of land for production	10	6	60	4	40	2	20	6	60	3	30	3	30	4	40	5	50	2	20	4	40	4	40
Opportunity for year round production	10	9	90	6	60	8	80	8	80	8	80	7	70	8	80	5	50	7	70	4	40	4	40
Profitability/ Income potential	20	8	160	7	140	7	140	6	120	7	140	6	120	7	140	5	100	5	100	4	80	4	80
Potential for Market Growth/Linkage	20	9	180	6	120	7	140	5	100	7	140	5	100	7	140	4	80	4	80	4	80	4	80
Vulnerability to climate change	10	3	30	3	30	3	30	3	30	3	30	3	30	3	30	3	30	3	30	3	30	3	30
Total	**100**		**740**		**580**		**530**		**540**		**610**		**490**		**550**		**400**		**400**		**370**		**370**
Rank			**1**		**3**		**6**		**5**		**2**		**7**		**4**		**9**		**8**		**11**		**10**

In the above table, four (4) value chains or sub-sectors were clearly ahead in scoring. Dairy (milk and meat) scored the highest, 740, and ranked first in the Selection Matrix, followed by Goat sub-sector, which scored 610 and stood second in the rank. Chili & Spice and Chicken & Duck scored 580 and 550 and stood third and fourth in the ranking matrix, respectively.

Shortlisting Matrix

The value chains or sub-sectors ranked in the first level screening were then put into a three by three Attractiveness Matrix or a Shortlisting Matrix to select the final sub-sector for in-depth assessment.

Dairy (milk) was positioned at the top "Most" attractive cell because of its potential to generate income and profitability and its opportunity for market growth. In the top three cells are the Dairy (milk), Dairy (meat) and Goat (milk and meat) which have higher potential to generate income for the poor and pro-poor while all of them demonstrate higher growth potential in terms of market linkage and expansions – locally, regionally and nationally. Therefore, the project decided to develop market systems intervention around these three sub-sectors, which commonly fall under a common sub-sector, 'Dairy'.

Degree of Income Potential/ Profitability			
High	Chicken & Duck	**Dairy (Meat)**	**Dairy (Milk)**
Medium	Chili & Spice	Fisheries	**Goat (Milk & Meat)**
Low	Potato & Pulse	Vegetables	Groundnut
	Low	Medium	High

Degree of Market Growth Opportunity

Justification to select Dairy (Milk & Meat) Sub-sector

Employment Creation

From input market of dairy to forward market or end market, about 14,000 people are directly involved. Therefore, the dairy sub-sector has created unique opportunities for employment across the value chain, especially in the pro-poor segment. Eradication of poverty is possible not only by supporting the dairy producers and entrepreneurs but by providing employment options in various segment or market functions such as processors, service providers, input sellers, sales agent, collectors, quality controllers, transport service providers and so on.

Enterprise Creation

There are about 25,000 dairy producers operating in Bogra region who follow traditional method of dairy farming. Another 700 households are involved in milk and meat processing. These individual producers and processors provide inimitable opportunities to spin off as social enterprises by adopting and maintaining sectoral standards and better management practices. Products produced by these enterprises can be brought under certifications such as Global GAP or HACCP, which will only increase the quality and grades of the dairy products, help these dairy enterprises connect with premium markets and by doing so get higher value from their dairy-based produces.

Growth Potential

High market demand for milk and meat, coupled with favorable business environment made the dairy sub-sector appropriate for growth and expansion. Both government and private sectors are increasing their investment on this segment of products; promote high yielding varieties for increased production of milk and meat by making quality inputs available through different sales and distribution channel. Many private sectors are interested to adopt Last Mile Distribution Model such as Grameen Danone[3] and JITA Social Business Ltd.[4] as alternative distribution model to tap into new market opportunities. Besides, the growing demand for “Safe Meat” and “Ready-to-Cook” meat items in the urban population offers product diversification and supply chain upgradation.

Moreover, the emergence of e-commerce and use of digital mobile applications for directly connecting with buyers can boost the expansion of the dairy sub-sector. Mechanization of farms, establishment of new processing units and introduction of cold chain management in the dairy supply chain will increase the sectoral performance and farms’ productivity by many times, if not double at least.

Market Viability/Linkage Opportunity (Local, Regional, National)

Dairy already has an established market linkage starting from local to regional and finally national level. Selling product is relatively easy and profitable as there is demand throughout the year. However, market competition has forced buyers collect products via intermediaries at a negotiated price. If this process is replaced by the sub-contracting or contract farming model, then the buyers can buy products directly for the dairy producers, at industry specifications. This will also ensure fair price for the producers.

3 https://www.danonecommunities.com/grameen-danone-foods-ltd/

4 https://jitabangladesh.com/

The dairy market is present with a good number of various market actors such as chilling plant and dairy processors, but the linkage and product standardization is still missing. This is where the opportunity for growth comes in.

Value Addition

It is already proven that the dairy market offers the most diversified and the widest range of value addition, given that the producers or the dairy enterprises can do better branding, packaging and marketing. A large number of processors exhibit “value addition” opportunities, but they lack appropriate skills, marketing knowledge and product certification.

Social Inclusion

Dairy production and marketing (milk in particular) is widely accepted by the communities irrespective of ethnicity, religion and gender. The value chain offers inclusiveness and equal openings, from input purchase to product marketing at forward market, for male, female and youth.

04 KEY FINDINGS

04. Key Findings on Dairy Sub-sector

National Scenario of Dairy & Meat Value Chain

Dairy and beef are major components of livestock sub-sector in Bangladesh. They occupy a crucial place in the national economy because primarily it provides rich nutrition in the form of dairy and bovine products. Apart from these, cattle can serve as raw materials in the form of hides and skins, bones, hoof and horns. The cow dung can be used as organic fertilizer and biogas production.

The demand for milk and meat consumption is increasing because of the rapid increase in population, the spread of education, economic growth and growing nutrition awareness. A decade ago, the availability of milk was only about 50ml/h/d, but significant changes have taken place in milk production during the last decade. As a result, currently the availability has increased to 158 ml/h/d against the recommended consumption of 250m/h/d. Meanwhile, the processing capacity of industrial dairies has been improved a lot as well. Recently, more than half a dozen milk processors are processing about 10 lakh liters of fresh milk daily, which is more than double the amount they could process a decade ago.

Regarding beef production, Bangladesh has traditionally been a meat-eating country while until 2018, the government for the first time declared self-sufficiency in meat production (with a production of 72.6 Lakh Metric Ton against 72.14 Lakh Metric Ton of demand)[5].

The milk production in Bangladesh is dynamic and varies from district to district. The primary milk zone is in Pabna-Sirajganj (which includes some parts of the project location) area, characterized by high-yield crossbreed cattle, better access to market and services and deep penetration of industrial dairies. The raw milk produced in this area is collected through different channels and supplied to major urban cities. Since the government emphasizes the necessity of dairy development in its 7th Five-Year Plan, there are more and more milk production zones emerging, even in suburban areas like Gazipur and Tangail. However, cattle farming is still largely dominated by smallholders in rural areas.

The recent trend of the dairy value chain is the quick spread of industrial dairies, including not only the leading firms but also the small and medium-sized entrepreneurs. Consumers in urban cities have better access to a variety of processed dairy products like yoghurt, pasteurized and UHT milk, flavored milk, etc. through retail shops and supermarkets. Compared to expand of industrial dairies, the traditional processors of sweetmeats are mostly family-based businesses and target mainly local consumers. The milk made sweetmeats are so popular and favored that in order to produce hundreds of varieties, the sweetmeat industry as a whole absorbs almost 75% of the total raw milk supply.

The meat consumption in Bangladesh has its deep link with its national cultural and religious background. The beef value chain is much shorter and less complicated than the dairy is. With minimum influence of beef industries, the majority of cattle are slaughtered and sold in a traditional way. Wet markets are the most common place to purchase beef.

[5] Livestock Economy at a Glance (2017-18), DLS

Although the beef value chain is rather straightforward, the by-products are of equal importance to be taken into account. Most of the by-products are generated during the slaughtering and butchering process. By-products like hides, bones and cow dung are gradually being fully collected or used, whereas animal blood is completely neglected and wasted in a considerable amount.

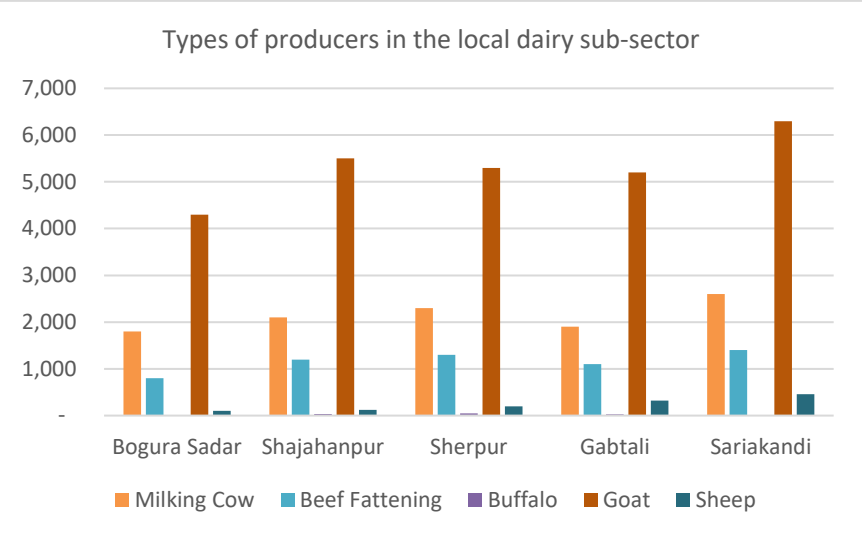
In summary, both dairy and meat value chains usually start with small-scale cattle rearing producers while thereafter demonstrate very distinguished features. Analysis that is more concrete will explain explicitly in the following sub-sections.

Local Market Demography

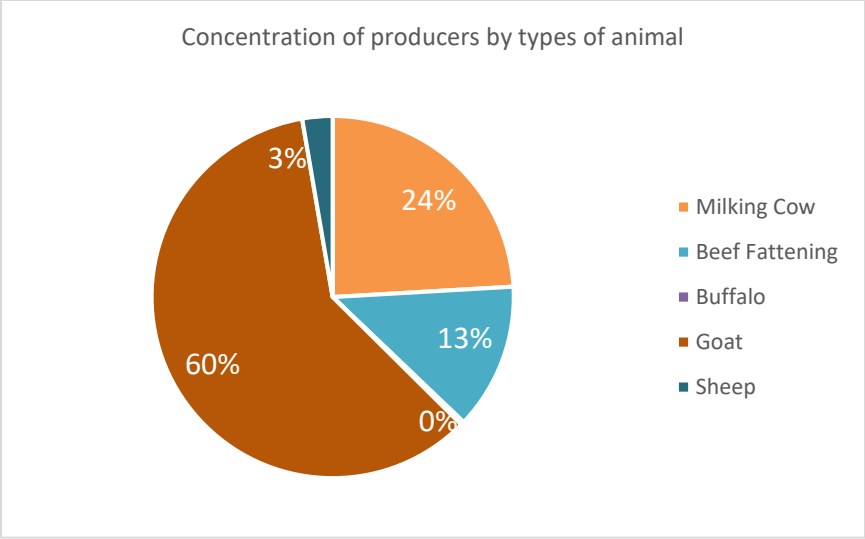
Demographic Profile of the Producers

Types of animals reared by the producers

Concentration of dairy producers are highest in Sariakandi (10,775 producers) and lowest in Bogura Sadar (7,010 producers). There are about 44,432 dairy producers operating in the five working upazillas.

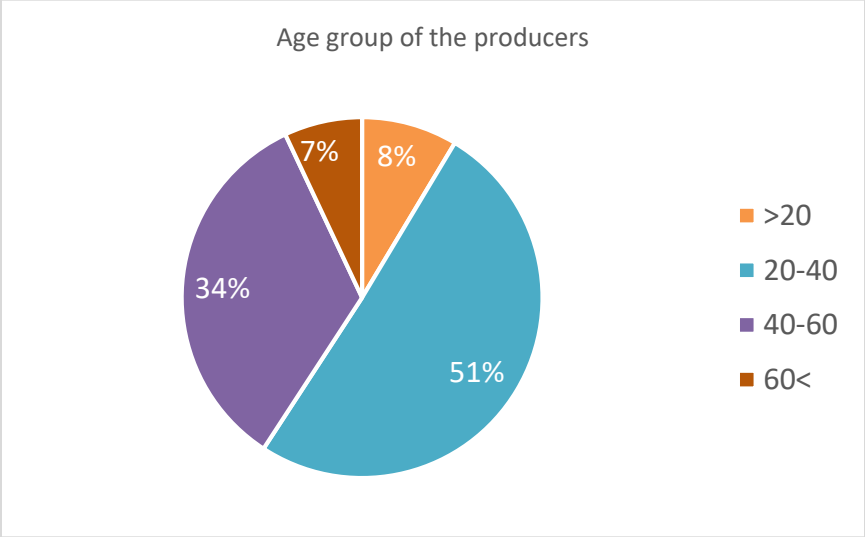


The sub-sector assessment found that the most animals reared by the producers are goats (26,600 goats) followed by milking cow (10,700 cows). The least animals reared are buffalo and sheep, 132 buffalos and 1,200 sheep respectively. There are about 5,800 bull reared and raised for fattening purpose in the project location.



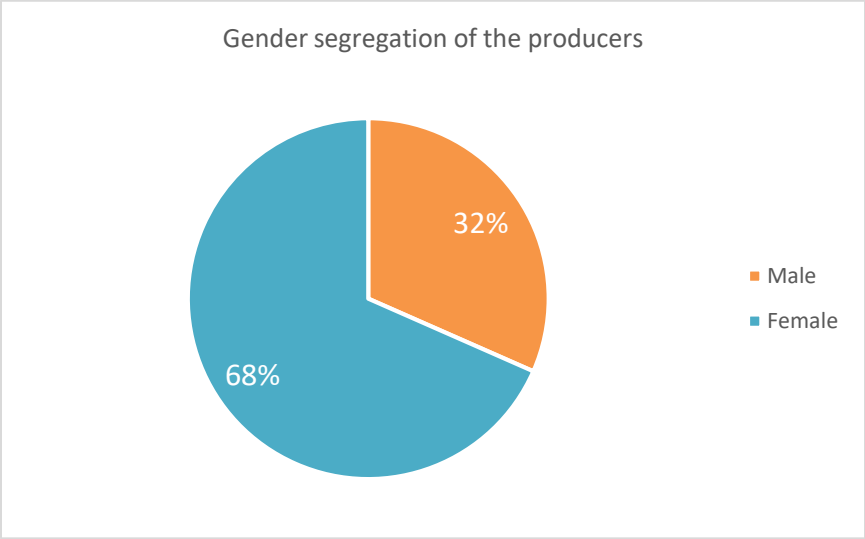
Age group of the producers

About 51 percent of the dairy producers in the project location are aged between 20 to 40 years followed by 34 percent producers who are aged between 40-60 years. Both the younger (age less than 20 years) and older cohort of producers (age greater than 60 years) represent only 7 percent and 8 percent respectively, of the surveyed population.



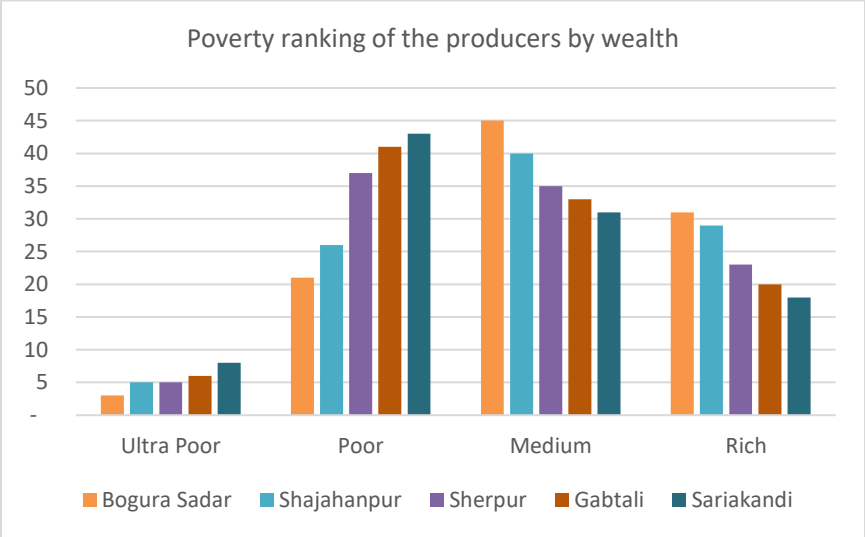
Gender segregation

Among the surveyed participants, women represent a greater involvement than men do in dairy production, especially cattle rearing. About 68 percent of the producers are female and the rest 32 percent producers are male.



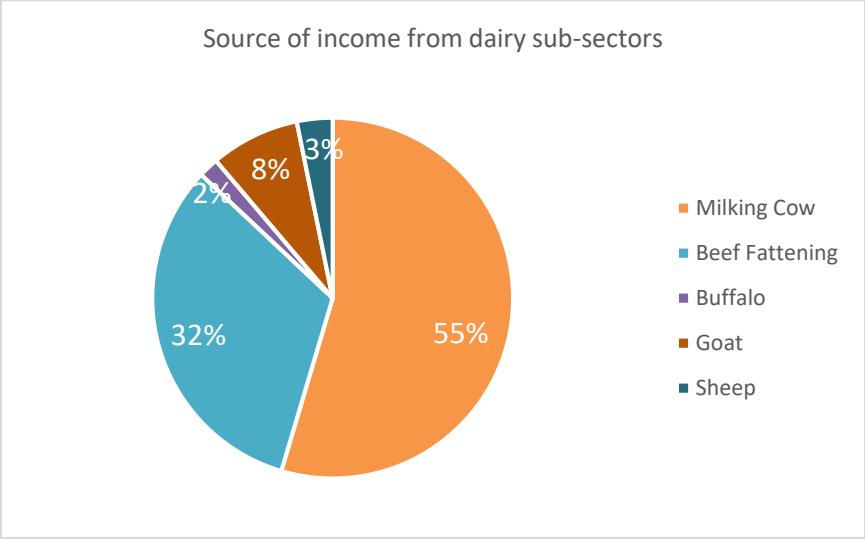
Poverty ranking

Producers mostly represent the "*poor*" and "*middle income*" based on the asset distribution or wealth ranking. About 34 percent producers are "*poor*" and 37 percent producers fall in "*middle income*" category. The assessment also found a significant number of producers are living a better livelihood; about 245 producers are reported fall in the "*rich*" category.



Source of income

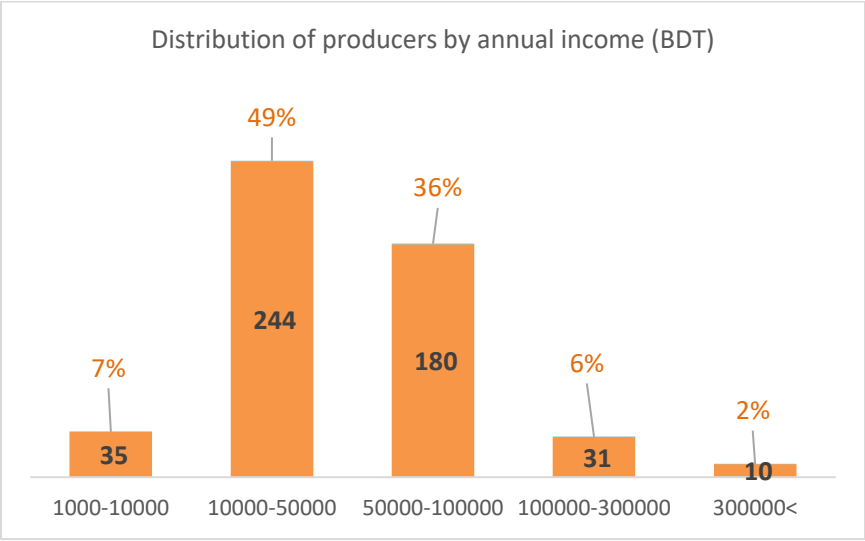
About 55 percent producers earn from milking cow (selling milk) followed by 32 percent producers who depends on beef fattening and marketing (selling cow). A small number of farmers earn from goat rearing (8 percent only) and a very small percentage earn from sheep (3 percent) and buffalo (2 percent).



Annual income

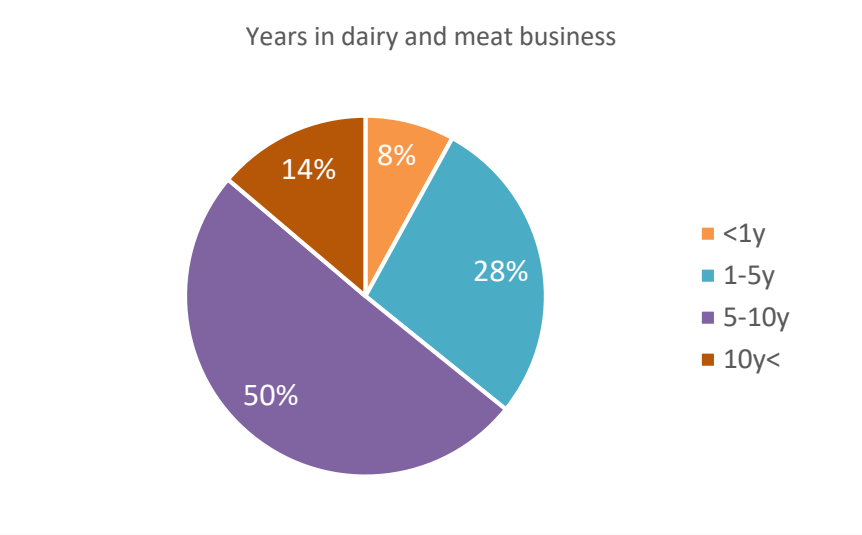
About 49 percent producers earn between BDT 10,000 to BDT 50,000 annually, which is followed by about 36 percent producers who earn between BDT 50,000 to BDT 100,000. Only 6 percent producers are found earning above BDT 100,000, between BDT 100,000 to BDT 300,000.

The assessment found that 7 percent producers' annual earnings from dairy and meat is less than BDT 10,000. This suggests that while creating the market linkage, interventions should be carefully designed for this segment of the producers.



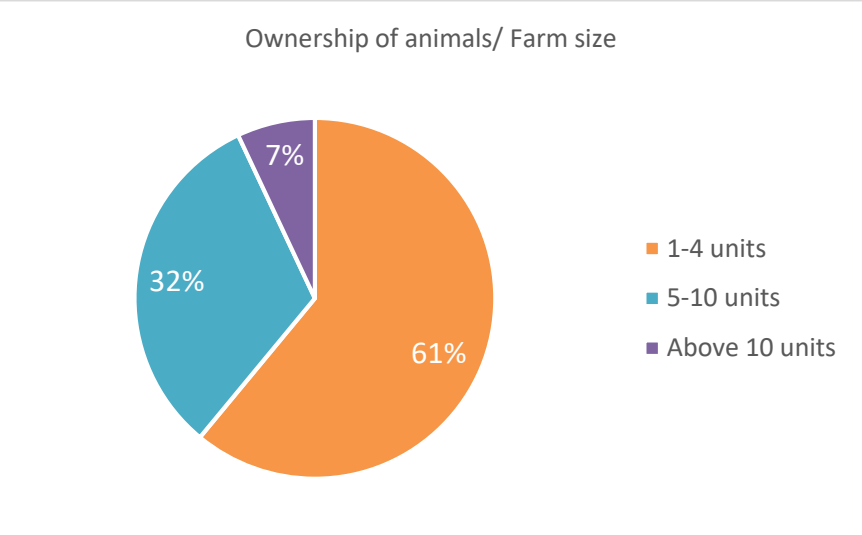
Years in meat and dairy business

About 50 percent of the surveyed producers are doing meat and dairy business for 5 to 10 years. This speaks about the producers' involvement in dairy and meat production for quite some time with some moderate experience. About 28 percent producers have experience less than 5 years, which depicts that this segment of the dairy producers have less experience and are relatively young in the sector. Only 14 percent producers have higher experience, 10 years and above.



Farm size

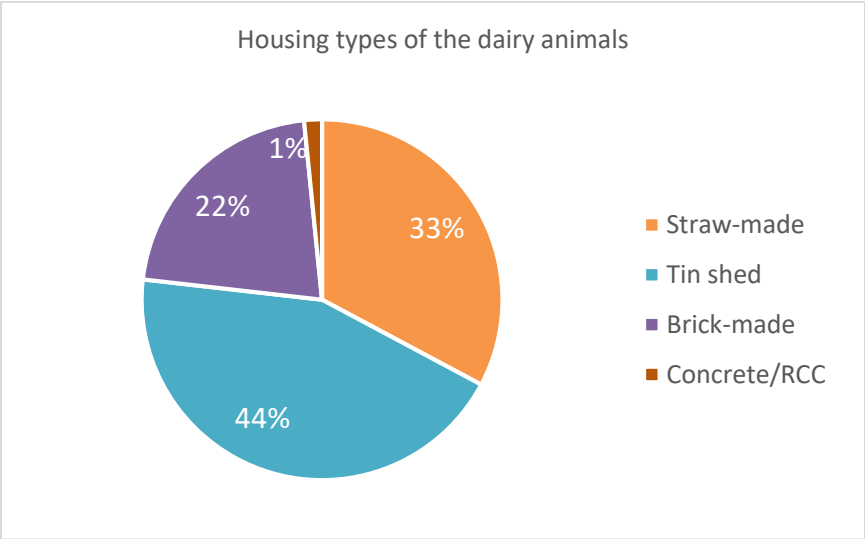
Majority of the producers are smallholder. About 61 percent have only one to four animals. About 32 percent producers have dairy animals that ranges from five to ten units. Only a small segment of the surveyed producers has more than 10 animals, 7 percent reported.



Major Farm Management Practices

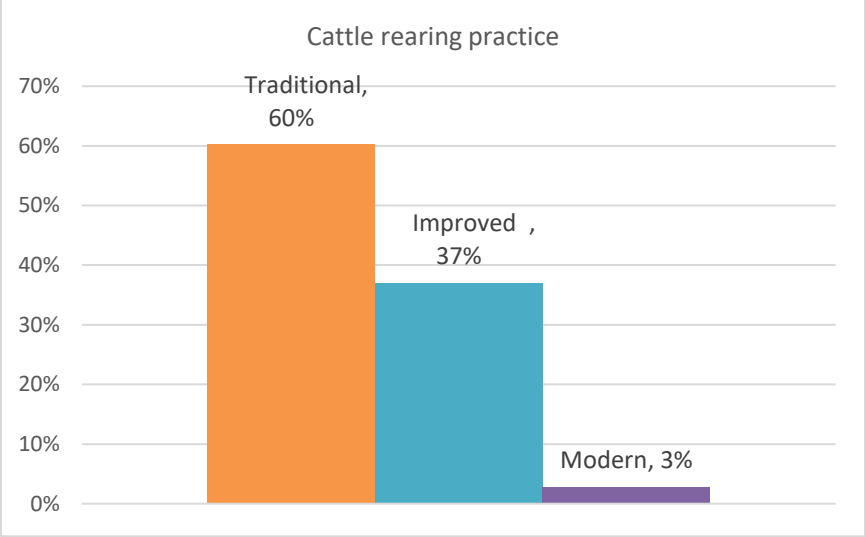
Housing types of the animals

Majority of the dairy and meat producers in the project location keep their animals in either straw-made shed or under a tin-shed. About 44 percent producers reported that they keep their animals on a tin-shed house followed by 33 percent producers who keep their animals in straw-made house. Some 22 percent producers have built brick or half-brick walls as shelter of their animals.



Cattle rearing practice

Roughly, 60 percent producers in the project location follow traditional methods of cattle rearing. Some 37 percent reported that they have improved their cattle rearing practices by following the neighbor farmers. Only a 3 percent producer has upgraded their farm into modern production system and adopted modern farming practices.



Core Value Chain

Input Market Scenario

Bangladesh has seen a considerable increase in milk and meat production after decades of artificial insemination. The introduction of exotic breeds has significantly changed its production systems in most milk and bull-fattening zones. The improvement in breeds also requires adequate feed supply to ensure proper animal nutrition and outputs. However, unavailability of high quality feed and ready-feed and the increase in feed cost pose a challenge to produces, who has limited input market access and less capital. This makes the local dairy production less profitable.

Breeds

Majority of the smallholder producers in the project location rear indigenous (Deshi) cow. The indigenous cow is featured by small size, low milk yield but good meat quality. One cow produces around 0.5-1.5 liter of milk per day, which barely brings any profits for smallholders. However, with red-colored skin, as well as soft and tender flesh, the bulls are popular for meat.

Some medium-sized farms rear a temperate breed such as Holstein-Frisian (HF). HF is one of the most productive breeds and the body weight of a pure HF can be twice as much as Deshi cows. With an average of 20-26 liter per cow per day, HF is one of the best choices for artificial insemination purpose and widely promoted. However, rearing of HF breeds requires higher cost. Hence, they cannot be managed by smallholder producers.

Some large farms are seen rear Holstein-Frisian (HF) and Sahiwal. Sahiwal is a tropical breed, originates in Pakistan and India. The skin color is generally light or dark red, which is close to Deshi cows. They show better performance in terms of milk production, with an average milk yield of 7.5-8 liters per cow per day and higher fat content (around 4.5%). These two breeds are highly preferred by Bangladeshi farmers for artificial insemination as the crossbreeds will not only produce more milk, but also can be sold as good quality meat.

Types of Breed	Annual Productivity of Milk (Liter/annum)	Per Cattle Productivity of Meat (KG)
Natives cattle (desi)	200L	100-120kg
Red Chittagong	420L	150-180kg
Pabna Breed	390L	170-200kg
Shahiwal	1050L	240-280kg
Holestien Fresien	2500L	400-450kg
Jersey	1600L	400-450kg
Buffalo	1800L	380-420kg
Goat/Sheep	50L	10-25kg

Feed

Feedstuff provides cattle with essential nutrients like protein, water, energy, vitamins and minerals, which are crucial for their health, growth and production. The possibility of success in cattle farming mostly depends on the quantity and quality of feed given to cattle. In Bangladesh, the biggest challenge in feed supply is the availability and cost, leading to a high production cost in cattle rearing. Farmers pay less attention either in quality feed supply, or pay high cost in purchasing feed that may put them at the risk of operating a loss.

The majority of the smallholder farmers in Bangladesh still follow the conventional patterns. In general, three categories of cattle feeding systems are identified, varying from a grazing mode to a semi- or a complete intensive mode. The first category, producers generally tether the cattle in the fields or on the roadside where the grass is accessible; or squat close to their house, feeding with household residues. The cattle reared under this grazing mode is usually under-nourished, with extremely low outputs.

Another feeding system is farmers leave their cows grazing freely during non-raining seasons. The advantage of this feeding mode is that cattle can obtain rich nutrition from abundant and fresh grass. Meanwhile, the animals can move freely and unrestrainedly, which is more conducive to their growth. Farmers with access to free lands and island chars benefit from grazing their cattle for as much as six months per year.

The third type can be found among the medium and large farms. Cows are reared in proper cowsheds and fed with green grass, dry straw and concentrates on a daily basis.

The most common green roughages in the project areas are fodder crops like maize and Napier grass. At present, only 0.1% of the total cultivable land is used for fodder production while the majority is used for cereal crops. This leads to a huge scarcity in green fodder supply. The increasing demand for fodder puts extra pressure on limited land resources.

The most representative grasses are Napier grass, Jumbo grass and Hybrid Napier, which can be harvested 6-8 times per year with annual yield of more than 40,000kg per acre. Particular types like Para grass and German grass can be grown in water logging conditions or marshy land, could be alternative options if cultivable land is not available. Production of high yielding green fodder by smallholder dairy farmers is the best method to reduce feeding costs, thus also increasing the chances that the farm will succeed in its project of generational up breeding.

Types of Feed	Major Sources of Feed	Average Purchase Price (BDT)
Straw	Local, Neighbors, Market	5-8 TK per ati or 5-10 TK per kg
Fodder	Local, Neighbors, Market	2-5 TK per kg
Loose feed	Homemade, Market	28-35 TK per kg
Ready feed	Market	30-40 TK per kg
Vitamin- minerals premix	Market	Various

About concentrates, wheat bran, rice polish, oil cake, molasses are the primary ingredients in cattle feed. Farmers mostly make concentrate in their own way, by mixing purchased ingredients with kitchen residues or on-farm by-products. Due to a lack of relevant knowledge and high costs for ready-made

concentrates, many farmers rarely or partially use concentrates to feed their cattle. Consequently, insufficient concentrates intake directly conducts to low milk production and lack of energy.

Artificial insemination and Natural Breeding

Animal health involves a complex array of functions and those who provide it similarly have a wide range of skills. There is no one type of veterinary service provider who is best for all functions, nor do all functions need to be performed in the same way in all production systems. Upazilla Livestock Office is primarily responsible to provide veterinary services to the local dairy farmers. Upazilla Livestock Officer, Veterinary Surgeon and Veterinary Field Assistant are the top most responsible persons to initiate, provide, maintain and support the local veterinary services.

Para-vets are those veterinary service providers who particularly involve with the treatment of disease and vaccination. As the vaccinations and treatment against prevalent and easily recognizable diseases are readily valued by producers, therefore, both public and private para-vet services are available in the project areas.

Vaccination Service Providers are those who provide vaccines to the livestock. The assessment found, generally para-vets perform the task of vaccination along with other medication service.

AI Service Providers are those persons who perform the task of artificial insemination of livestock. Government and BRAC artificial inseminators have been found visible in the RMTP project areas.

Livestock staff are not employed at union or village level, unlike the Agricultural Extension service. The support staff is employed at the upazila vet clinics, so each such staff has to cover about 15 villages or about 2-3 unions. Consequently, they can do very little beyond assisting the upazilla vet officers at the upazilla clinics. In the absence of adequate access to proper vet care at reasonable cost, poor producers often resort to traditional medicine with poor outcomes.

According to the value chain assessment, HF and Sahiwal are two breeds primarily being promoted by the District Livestock Offices (DLO) and Upazila Livestock Offices (ULO). There are several types of semen supplied to farmers, usually with 100%, 75%, 68.5% (or 62%) and 50% of HF blood and 100% of Sahiwal blood. Sometimes Sahiwal semen runs out quickly because it is highly appreciated by producers for its dual functions.

Semen of good performance local breeds is also available, but only accounts for less than 5% of the total demand. The target for dairy crossbreed, in general, is around 80% according to DLS officers at the district level, as beyond this percentage, the cows would not be able to stand the environment and the humidity. There is a tendency that the focus of promoting crossbreed generally starts from the capital of district (Sadar area) and then spread to the surrounding rural areas, leading to local breeds are more aggregated in remoter areas.

In addition to artificial insemination, natural breeding is an alternative option, particularly in remote areas. Usually, natural insemination happens in cases that cows mate while grazing in open areas, or mate with the help of a particular inseminator. Producers who prefer natural insemination service mostly because of its high conception rate, compared to AI (average 50%) and its low service cost. However, natural breeding may cause venereal diseases or inbreeding problem especially when bulls are limited in number in a particular area. Moreover, there is no particular control for breeds or percentage of foreign blood used for natural insemination, as no proper record is existing for this informal option.

Production Market

In the project locations, the dairy milk and meat producers are classified in three (03) groups by the ownership of cows. Smallholder producers own 2-3 cows; medium producers own 4-10 cows and large producers have more than 10 cows.

About 60 percent of the producers are smallholder and rear indigenous (Deshi) cow. About 30 percent producers are medium enterprises who rear local crossbreed and some (1-2 cows) Holstein-Frisian (HF). Rest 10 percent are large producers who has mostly the Holstein-Frisian (HF) breeds and some Sahiwal breeds.

Production of Milk

Rural smallholders who own less than two indigenous cows seldom depend on the revenue of milk sales. Even though the local breed consumes less feed and has high disease resistance, its low milk production can barely bring farmers out of poverty. In the project area, it was found that the average daily milk production of an indigenous cow is between 1.5-3 liters. Producers that rear hybrid and crossbreed can yield 5-8 liters and 10-12 liters respectively. The maximum yield is given by HF breeds, 15-25 liters a day.

Production of Meat/ Bull Fattening

There are only a few middle and large-sized farmers completely involved in the bull fattening system. Indigenous breeds are the most favorable variety for meat. Farms with a scale of less than 20 bulls often have one fattening cycle per year, mainly targeting Qurbani to make maximum profit. Large farms with more than 50 bulls may reach four cycles per year. They often purchase male calves in bulk from cattle traders, and supply to large cattle markets in urban areas.

Most small-scale producers do not do bull fattening. Bulls are usually fed with household scraps or dry straw without any particular treatments, which cannot result in much bulking. Smallholder farmers always sell bulls or old cows for meat purpose that no longer produce milk. This happens mostly during Eid when there is peak demand for beef consumption. Unlike milk sales that can bring daily income, bull fattening is a longer process that hardly gains any immediate profit. Instead, to make sure that bulls gain enough weight, a huge amount of feed has to be provided for at least four months. Therefore, it requires producers to have enough reserves or financial support in order to afford the whole fattening process. As a result, small-scale producers generally tend to sell male calves instead of keeping them for fattening. There are only a few middle and large-sized producers completely involved in the bull fattening system. Indigenous breeds are the most favorable variety for meat.

The average cost of bull fattening is BDT 50,000-55,000 which are reared and sold after six months at a price of BDT 70,000-90,000 that gives producers a profit margin of BDT 15,000-20,000. There are few farmers who purchase frequently buy and sell cows, keep them for a period of 2-3 months. Each cow, depending on the size and weight, is sold at a price of BDT 60,000 up to BDT 100,000. The margin from selling such cows is less, BDT 3,000-4,000; however, producers who are involved in such process usually sell up to 30 cows a month, thus making a handsome amount of profit of BDT 90,000. However, such number of producers are less than 5 percent.

The business has been largely affected by the smuggling of bulls from India. Each year, thousands of Indian cattle have flooded into Bangladesh through informal cross-border trade before Eid-ul-Azha.

The influx of Indian cattle often results in a decrease in price, significantly affecting local bull-fattening business. Farmers profit less than they expect during Eid thus constraining their reinvestment. Meanwhile, the situation might become worse if diseases like FMD brought from Indian cattle are spread among local breeds, as there are no efficient vaccines available. Since Bangladesh gradually achieves self-sufficiency in meat, and with a much tighter control near the border, the number of smuggled cattle has decreased in recent years.

Forward Market

The forward market of dairy milk and meat consists of milk collectors, milk processors and cattle traders. The following section will describe the actors and their functions of the entire forward market of dairy value chain in Bogra.

Milk Collection

Milk collection is a critical value chain segments as it directly links producers to various buyers. In Bangladesh, the milk collection systems are dynamic and diverse in different areas, depending on their development levels.

Traditional milk collector

Traditional milk collectors are commonly known as “gosh”, who are the key Value Chain actors who link rural dairy producers to the next buyers. Individual collectors source milk from door to door, using three-wheeled vans to carry milk pots. No chilling tools or facilities are being used because they are usually able to deliver milk to chilling centers or processors within the time limit.

In general, milk collectors maintain a relatively stable relationship with producers and buyers by oral agreements. Milk is collected twice per day (morning and evening), and is being delivered to the nearest collection centers, larger collectors or traditional processors. It is not a common practice for collectors to test milk purity and fat content, primarily because they are concerned more about quantity rather than quality. Meanwhile, due to a lack of simple and manageable tools, milk testing is not applicable for most collectors. Experienced collectors can judge whether the milk is adulterated by the color and taste. While some collectors tend to milk the cows by themselves to ensure its quality. However, these methods are not time-efficient and may risk of receiving milk with other additives that are not visible.

For areas that are yet penetrated by dairy companies, collectors supply more than 90 percent of sourced milk to local chana and sweetmeat makers, whereas in large milk zones, milk collectors have diversified channels to sell their milk.

Company-owned milk collection centers

To expand the milk market, leading dairy companies like PRAN and Aarong Dairy have set up a considerable number of Village Milk Collection Centers (VMCC) in major milk zones in Bogra. A collection center is generally equipped with chilling tanks, a mini laboratory and a weighing machine. Milk is collected from farmers or producer groups twice per day. Suppliers receive payment based on the fat content of their milk. Companies send chilling trucks to collect milk from each collection center and then transport to their manufacturing plants or hubs for further processing. Such companies have been witnessed a rapid expansion by owning immense investment capital and offering fair prices, embedded services and stable demand, attracting various types of supplier. In spite of this, only the

producers in major milk zones benefit more from these collection centers, because these companies tend to choose areas with relatively high levels of development and have better road conditions.

Cattle trade

The trade of fattening bulls mostly depends on cattle traders. Apart from being sold directly to butchers, farmers sell bulls to small or large-sized traders. The trade activities are largely aggregated in the districts, which are close to border and certain peri-urban areas. Traders source bulls from individual farmers and then transport and sell these bulls in urban cities like Dhaka, Chittagong, etc. There are two types of cattle trader. One conducts trade activities more frequently (more than 200 times per year) with relatively limited number for each batch (2-5 bulls per time). While the other only sells when the collected bulls reach a certain number (>20), mainly targeting Qurbani. Local breeds are highly preferred by traders (> 90 percent), followed by Sahiwal cross and buffalo. Old dairy cows are often sold for meat as well.

Nearly 50 percent of the cattle have been traded every year during Qurbani. The sale price of one bull is 5,000 – 20,000 BDT higher in Qurbani than normal periods, depending on the animal weight. Because traders are generally not involved in bull fattening, the cattle are usually kept for less than one week. Otherwise, there will be additional feed cost of BDT 110-140 per day per animal, greatly affecting their profits. According to the sub-sector assessment, traders do not seem to be making big margins during Qurbani because the purchasing price increases at the same time. Additionally, a huge amount of Indian cattle is rushed into Bangladeshi cattle market, decreasing the price of local breeds. Transport and labor costs are two additional key cost elements in cattle trading. Meanwhile, sometimes cattle traders have to suffer losses because of animal death or diseases when being transported to urban markets from a long distance.

Milk Processing

Traditional Processors

Sweetmeats, a traditional food in Bangladesh, occupy an important place in the diet of Bengalis. Every year a large sum of sweets are consumed by households during all types of domestic ceremonies, national festivals and important events such as the celebration of examinations, weddings, Eid, Puja, etc. representing best wishes and good will.

Milk is the main raw material for making traditional sweets, resulting in nearly 80 percent of the total milk supplied to this traditional channel. Traditional processors are divided into two types. The first type is what we know as intermediate products processors. They source milk to make chana, curd, cream and ghee (butter oil). Chana is extracted from raw milk and served as a key ingredient for most of the indigenous sweetmeats. Processors supply chana to sweetmeat shops or factories, mostly in peri-urban and urban areas, for further processing meanwhile they sell ghee or curd directly to consumers. The second type is the processors for final products, known as sweetmeat makers. They usually own sweetmeat shops (sometimes with processing areas in the backyard) and directly sell the final products to rural and urban consumers. However, if milk can be easily sourced from their own district, the sweetmeat makers generally make chana on their own to reduce additional production costs.

The main suppliers of milk are farmers and milk collectors. The average prices of sourcing milk is around BDT 41 to 44 per liter. No formal contract is signed between suppliers and processors. The most common way is an oral agreement on a regular payment based on volume. As sweetmeat

making is a profitable business overall, so processors in general re-invest in their businesses with own finance. The revenue is also enough to afford daily milk purchasing.

The use of powdered milk in traditional processing is directly affected by the seasonality of the raw milk supply. In general, the peak season for sweetmeats is during winter when the milk supply is relatively stable. For events that take place during the low season of milk supply, powdered milk might be used to fill the supply gap. The market for sweetmeats is more or less saturated which gives most of the sweetmeat makers have no incentive to expand their businesses despite having the ability to do so.

A major concern of traditional processing is food safety. Due to a lack of regulation and low awareness regarding hygienic practices, the sweetmeats are frequently contaminated and it may cause foodborne diseases. Sweetmeats are usually made manually with minimum equipment required (saucepans, basined tub, etc.). Most of the equipment is reused for three to four years.

Industrial leading dairy companies

A few leading companies, such as Milk Vita, PRAN, BRAC Dairy, Aftab, Akij, Rangpur Dairy, etc., have their own marketing channels from collection and processing to retailing. These companies often set up processing plants either close to the milk zones to ensure a stable milk supply, or near urban areas to approach consumers. The biggest processing factory of Milk Vita is at Baghabarighat in Sirajganj (major milk zone), which has a capacity of 135,000 liters per day. Milk is pasteurized in the factory and made into various products like ghee and powdered milk. Part of the pasteurized milk is sent to the factory near Dhaka to produce short shelf-life products, such as curd, ice cream and packaged flavored milk. PRAN has five 95) dairy hubs linked with 100 VMCCs. Meanwhile BRAC dairy has 101 chilling centers with a daily capacity of 170,000 and 24 percent of the market share. Value-added products have been produced and sold to the market to fulfil diversified demand: cheese, butter, yogurt, UHT and pasteurized milk, ghee, etc. These three companies account for 80 percent of the market share among all private dairy enterprises.

Meat Slaughtering and Butchering

Local slaughterhouse

More than 80 percent animals are slaughtered outside the slaughterhouses of city government with very poor means of meat safety. The rest of the animals are being slaughtered inside the slaughterhouses managed by local government. Most of the slaughterhouses are lacking basic amenities such as light, ventilation and water. Due to the scarcity of water, butchers cannot wash carcasses and clean slaughterhouses properly. They often clean carcasses manually carrying water in a bucket. They clean the stomach in the pond resulting in huge water contamination. The slaughtering and carcass-dressing processes are performed in open areas in highly unhygienic conditions and the meat is sold with little or no veterinary inspection. Carcasses are prepared in unhygienic conditions in local slaughterhouses. In rural and urban areas, towns and even in cities, the slaughtering of animals is still done by unauthorized butchers in fields, bushes, backyards or roads, where killed animals are eviscerated and dressed. In the case of goats, it is usually performed by hanging. Blood, ruminal and intestinal contents are either left where the slaughter has taken place or washed down to drain which eventually ends up in a pond or a watercourse.

Industrial processing

Meat processing in industrial plants is a very recent addition to the food processing industry in Bangladesh. Bengal Meat Processing Industries, situated in Sathia (Pabna district) are the only

modern beef and mutton processing facility in operation. Combined, these facilities process less than one percent of total Bangladeshi meat production. The processing capacity of Bengal Meat is 6000-8000 cattle, 50,000 to 70,000 goats and 1,800,000 to 2,000,000 chickens per year31. They process meat into ready-to-cook nuggets, sausages, and other prepared products. Bengal Meat used to export meat but since 2014, the export failed due to its low-price competitiveness. The company then shifted its attention to the domestic market and currently only keeps 10 percent of total sales targeting oversea markets, such as Maldives, Qatar and UAE. Cattle slaughtered in modern slaughterhouses, then processed and packed directly in factories, is finally marketed through fast food shops, superstores and convenience stores. Regarding the geographical dispersion, Bengal Meat targets 70 percent in urban and 30 percent in rural areas.

The biggest challenge for industrial processing is the difficulty in reducing production cost. High duty fees constrain the company to invest more capital to purchase modern facilities like sausage filler, smoke houses, ice flake machines, MAP packaging systems, etc. Meanwhile the high rates for electricity creates additional costs. Due to its high production costs, the sale price is much higher compared to the raw meat in wet markets. Therefore, the targeted consumers are often limited to the middle and upper classes, those with higher income.

Service Market

Veterinary Services

One of the key cost components of cattle rearing is the veterinary services. Since insurance service is not widely applied in the livestock sector, for small-scale farmers, any reduction in productivity or death caused by animal diseases cause huge economic losses. Farmers need to be familiar with the symptoms of common diseases and take preventive measures.

Vaccination is recognized as one of the most efficient ways of preventing diseases like Foot-and-Mouth Diseases (FMD). Domestic vaccines are mainly produced and distributed by DLS. More universities and private companies are involved in the research and development of animal vaccines. Still, the total vaccine production is not sufficient to meet the local demand. Currently only 50% of the dairy producers vaccinate their cattle. The quality of vaccines is not ensured. One of the main reasons is that there is no complete cold chain and hygienic environment existing to protect them from contamination or cross-contamination.

Compared to vaccination, the number of producers who use deworming tablets is much less. When cattle grazing in open lands, parasites can easily enter the digestive tract and affect cattle's performance. Only 35% of cattle have been de-wormed. The lack of or irregular usage of deworming drugs is mainly due to producer's limited knowledge. They cannot identify parasitic infections through symptoms and indicators and are not aware of the importance of immediate deworming treatment.

Department of Livestock Service (DLS) is committed to providing animal health services to rural producers at district and upazila levels. Each Upazila Livestock Office is equipped with veterinarians and field assistants. Producers can bring their animals to the animal hospital for diagnostics and prescription, or call for field assistants to provide door-to-door services. The most common services that ULO provide is general diagnostics, pregnancy test, delivery of calves, AI services as well as surgeries. The services are usually free of charge but producers pay for transport and medicines.

Compared to the cattle population and huge demand in high season, the number of DLS veterinarians are extremely scarce. Therefore, multiple actors engage actively in veterinary service provision to bridge the gap:

- Paravets who are linked to DLS often receive training through a youth development program of the government and obtain a payment based on the services that they provide. They are not officially employed by DLS, but they can effectively assist ULO's veterinarians.
- In primary milk zones, companies such as PRAN, Milk Vita and BRAC provide embedded services including veterinary services to their suppliers.
- Independent veterinarians in villages, part of whom also work for pharmacies, offer diagnostics and act as sales agents of medicines.
- Animal health workers who have been trained by NGOs deliver services to members of producer groups. These workers usually receive regular training and they are able to promote advanced technologies to producers, such as using a test kit for mastitis and mixed herbs for recovery.

Types of Sevices	Average Cost of Service (BDT)
Door-to-door service (nearby)	200-350 TK
Door-to-door service (long distance)	400-500 TK
General Treatment	200-300 TK
Artificial Insemination	200-450 TK
Pregnancy Test	300-350 TK
Delivery of baby	800-1000 TK
Vaccination	300-900 TK
Surgery	700-1000 TK

As mentioned earlier, the conception rate of AI is considered low, on average about 50-60%. The underlying causes of this low rate are:

The technical capacity of AI workers: Many AI workers received minimal formal education and systematic training. Some only participate in a three-month training, which can hardly meet the requirements. However, to ensure the success rate, the operation of the inseminators must be hygienic, accurate and skillful in order to prevent semen from being contaminated resulting in the decrease of its survival rate. Proper AI techniques should not cause additional physical injury during operation, which may affect the delivery of cow calves afterwards.

Ability of producers to identify heat of their cows correctly: Because of insufficient training, producers often cannot accurately detect heat and identify the appropriate time for breeding. In most cases, producers only call for individual services and choose the preferred breed without considering carefully the potential impacts. This requires careful daily monitoring of the herd and clear breeding records.

Animal nutrition: Cattle need special care in nutrition. Without adequate intake of some essential vitamins and minerals, they will not reach their full potential. However, in practice, producers pay less attention on animal nutrition resulting in malnourishment of their cows, largely affecting the milk and meat production capacity as well as reproduction.

Labor Market

According to the survey, most of the small-scale dairy producers are self-employed in their own farm or own business, and the livestock-related work is usually jointly done by all the family members. However, the division of work is quite different. In general, women spend a lot of time on conducting indoor activities such as housework and livestock rearing with very little fixed income, while men are often responsible for outdoor work like transporting milk or cattle, purchasing feed, contacting veterinarians, etc. Some of them also have jobs other than agriculture and livestock, as the main source of income for the family. Only large and medium-sized farmers (cattle herd >10) hire one or more full-year labor forces to run the farm. However, instead of a formal contract, they prefer to make verbal agreements, with an average daily wage around 250-300tk.

Sweetmeat making is also a key segment to provide job opportunities. Each shop hires around 4-12 workers, mostly youth, for sweetmeat making and sale. Due to the miserable working conditions, women are barely directly involved in this industry, but rather assisting their husbands if it is a family business.

Financial Services

Value chain actors have access to finance through various channels, both informal and formal. Dairy farmers can benefit a 5% interest rate from banks and non-bank financial institutions and the Government provides 5% cash subsidy[6]. Apart from bank loans, MFIs, cooperative funds and private financing are the most common choices for value chain actors, particularly for small-scale producers.

The majority of small-scale cattle keepers fund their businesses through their own sources. Usually, the milk sales are too minimal to become the primary source of income for the household. So the money used to invest in cattle rearing often come from their own funds or savings, such as crop sale, transport services and other types of labor-incentive work.

The most common informal channel is borrowing from friends and relatives, which is the economic and fastest way. Some dairy farmers take loans from Micro Financial Institutes (MFIs). For example, TMSS provides loans in large amounts for dairy farmers with the aim of purchasing veterinary inputs and feeds. Field officer makes visits to lenders' farms to identify their business situations and analyze if they have the ability to pay back. Farmers who get loans from TMSS leave 5% as deposit, and with an interest rate of 2% per month.

Very few producers link to state banks or commercial banks, as the interest rate is relatively high (10%) that smallholders have no ability to repay the loans.

Market Enablers (Enabling Environment)

Policies, Regulations and Laws

The focus of livestock policies in Bangladesh evolved over the decades, moving from government-centered animal disease control, to breed, feed, slaughtering and extension services development (see table below) which values increasingly the engagement of private sector. The important role of the livestock sub-sector in the national economy has been emphasized in the country's five-year plan

[6] Annual Report 2016-2017, Bangladesh Bank, Chapter 9 Agriculture and MSME Finance.

for realizing self-sufficient in domestic supply and poverty reduction. In 2007, the Government of People's Republic of Bangladesh issued the "National Livestock Development Policy" (NLDP) which has specified the development objectives of the livestock sector and set the scope and implementation strategy. The general objective of the NLDP is:

"To provide the enabling environment, opening up opportunities, and reducing risks and vulnerability for harnessing the full potential of the livestock sub-sector to accelerate economic growth for reduction of rural poverty in which the private sector will remain the main actor, which the public sector will play facilitating and supportive role."[7]

The NLDP encouraged the participation of the private sector in livestock development, while shifting the role of the public sector to a facilitator and enabler. Meanwhile, the government clearly identified the main constraints and development priorities in dairy, meat, poultry and by-products sub-sectors. The barriers, including a lack of appropriate breeds, quality feed, veterinary services, credit support and insurance coverage, as well as a knowledge gap of smallholders and absence of market information and regulatory body, have turned to be the main targets of the subsequent policies. Similar obstacles are also faced by meat production, while special attention has been paid to the enforcement of legislation regarding the unsatisfactory sanitary conditions of slaughtering and meat inspection.

In addition, there are some targeted policies covering specific aspects as listed in the table below. Despite the fact that a series of policies and acts have come into effect, ineffective execution remains a great challenge. According to the field survey, more than 2/3 of farmers interviewed recognized that the policies and regulations provide a favorable environment for cattle rearing; however, they cannot clearly tell the exact benefits acquired. Dairy farmers care more about the price of feed and milk. They would like policies to guarantee quality feed at a good price and the government to influence the price of milk. Similarly, bull-fattening farmers would prefer more control on the cross-border cattle trade as such huge amount of smuggled Indian cattle would significantly influence the local cattle price.

Traditional processors generally feel that there is no supportive policies and regulations particularly for sweetmeat industry and their products cannot be certificated by BSTI because of short shelf life. The slaughtering activities are usually monitored by the Municipality or Upazila Livestock Officer, but not consistently in all districts. Meanwhile, there is no particular standard for butchers to maintain when selling fresh meat. Consumers concern more about unadulterated food, however, there is no means for them to trace the origin of products or obtain adequate information about their quality.

Processing Standards, Norms and Compliances

Food safety is always one of the core criteria when consumers purchase certain products. In Bangladesh, the enforcement of regulations, rules and acts is weak due to insufficient resources and unclear institutional arrangement. There are various ministries involved in animal-sourced food products but their roles and responsibilities are disbursed. Industrial dairies are caught periodically by producing unsafe products and are temporarily shut down. However, this temporary punishment does not solve the problem fundamentally, as certain companies re-open without having made major re-adjustments. Gradually consumers will lose trust in the industrial processing products thus undercutting the market demand. The food inspection for traditional products is less frequent and enforcement is weak. Most traditional products cannot meet food safety standards and the working

[7] National Livestock Development Policy (2007)

conditions are poor. Low-quality products may generate less income for traditional processors. As a result, the flow of value is limited through the chain.

Similar problems are observed in cattle slaughtering. Even though DLS has issued two slaughter acts, the enforcement guidelines are not clearly defined, resulting in disorganized slaughtering practices existing in the country. Meat sold in the wet markets or from roadsides does not have any quarantine certificate. Consumers may risk having food-borne diseases by eating the low quality or contaminated meat products.

Physical Infrastructures

For the dairy sub-sector, transportation is an essential influential factor. It determines whether milk and dairy products can be delivered to consumers promptly under conditions of freshness and good quality. In Bangladesh, most milk producers and collectors use traditional methods of transport. They use the spelter or stainless steel milk pots to collect raw milk and send it to the milk collection center or intermediate products processors on foot or by tricycle truck. For producers from char areas, boats are needed to ship the milk to the local market. These can be only used for a short distance because of the limited carrying capacity. Large milk processing companies have set up milk collection centers in many parts of the country, most of which are equipped with testing and chilling facilities. Since most of the milk collected by the companies is sent to big cities like Dhaka or peri-urban areas, usually the companies have their own milk trucks, which are equipped with refrigerated facilities to ensure that the milk is kept in a suitable temperature during transportation. Companies usually have their own transportation network so in this sense the collection and distribute channel will not be a great challenge. However, road conditions in Bangladesh are not perfect. Due to the river channels across the country, roads in many regions are not well connected. Moreover, some well-established roads have a great possibility of being destroyed by floods during the rainy season and cannot be repaired in time. Coupled with the traffic congestion in large cities such as Dhaka, the transportation time is further lengthened, which greatly affects the quality of milk. Road conditions also affect greatly the efficiency of service delivery. For farmers living in remote areas, they have to pay higher veterinary fees as the transport cost is relatively higher.

Due to the long transportation time, a complete cool chain is essential to guarantee the quality of milk and dairy products. In most of the cases, the collectors (gosh) are the only link between producers and processors. Although collectors will sell out all of the milk to the processors within a half day, however, in summer, the milk will be easily are spoiled with such high temperature, thus creating food losses during the collection phase. For the processing stage, the traditional sweetmeat makers lack the basic testing machines to inspect the raw milk quality, only judging based on their years of experiences. Once the sweets are done and sold in the shops, the leftover is usually being kept in the normal temperature rather than in the refrigerator, or being directly thrown away which conducts to many food wastes. Dairy companies have better performance compared to the traditional processors in terms of storing products as they have set up modern cooling facilities to ensure quality control.

Information & Communication Technologies (ICT)

Using mobile apps is a useful way to help farmers adopt better dairy farming practices. Government and NGOs play an important role in promoting the apps and teaching farmers how to use it. For example, the application Feed Master developed by Bangladesh Livestock Research Institute (BLRI) guides the producers to learn proper ration formulation for their cows depending on the weight and breed. Farmers can also set vaccination reminders to make their cows vaccinated in time so that to avoid a big loss due to serious animal diseases.

Leading dairy and meat companies have also adopted new business models to promote their products online through their own e-platform. Urban consumers then have more channels to access dairy and meat products. Company like Bengal Meat starts a trial on promoting online cattle trade for Qurbani, which leads to a new trend for cattle transaction.

Technological, Institutional and Organizational Innovation

A great number of public and private institutions are actively engaging in research and service promotion for the development of dairy and beef sub-sectors. Among all the actors, the DLS works within the mandate of the Ministry of Fisheries and Livestock (MoFL) and plays a lead role in dairy development. It carries out a series of extension services including artificial insemination, genetic preservation, veterinary services, and vaccination promotion at national wide.

Bangladesh Livestock Research Institute (BLRI) is a national institute whose aim is to solve the problems associated with the livestock sector by conducting modern researches. Established in 1984, BLRI is mainly committed to improving productivity, increasing incomes and improving livelihood standard of farmers. The institute has taken the leading role in developing new technologies with the aim of increasing production of meat, eggs and milk, and promotes them nationwide. A total of 56 technologies and 19 packages have been innovated and mainly delivered at the local level through DLS. One of the initiatives that is being promoted by BLRI is using Moringa as cow fodder to increase milk production. Study shows that milk production can increase by 40% to 60% by feeding Moringa. BLRI develops a variety of animal vaccines for the control of animal diseases (like FMD).

Development organizations and NGOs are actively engaging in providing innovative models or technologies for improving dairy and beef value chains. As a new model, the school milk-feeding program has been applied jointly by FAO and Milk Vita to expand local demand and improve nutrition for children. Local NGOs are assisting farmers in adopting new technologies to improve their farming practices, such as using test kits for mastitis, or calculating feed ratio on the mobile phone. In general, advanced technologies are not widely applied in the practices. Some pioneers (NGOs and researchers) test in pilot areas but more technical support and exchange with the external world is needed.

Socio-cultural Norms (Gender Role)

For small-scale farmers who raise cattle, nearly all family members are involved in daily farming activities, while the role for men and women are not the same. Most of the women are mainly engaged in daily care such as preparing homemade and on-farm feed, milking and cleaning the sheds. While men are taking care of the activities outside the homestead, such as delivering and selling milk and cows, seeking services and purchasing feed for cattle rearing. There are fewer women involved in farms that are fully engaged in bull fattening because the bulls have greater weight and strength which are difficult to control. In terms of land ownership, 85 % (verify) of the land is owned by men and very little land is jointly owned. This largely constrains women to join cooperatives and access finance. According to the survey, most of the interviewed households responded that the income from selling milk or cattle was shared by both husband and wife. However, when deciding on the direction of re-investment (e.g. purchasing a new cow), man's opinion is decisive. Women tend to spend more on food to improve family nutrition.

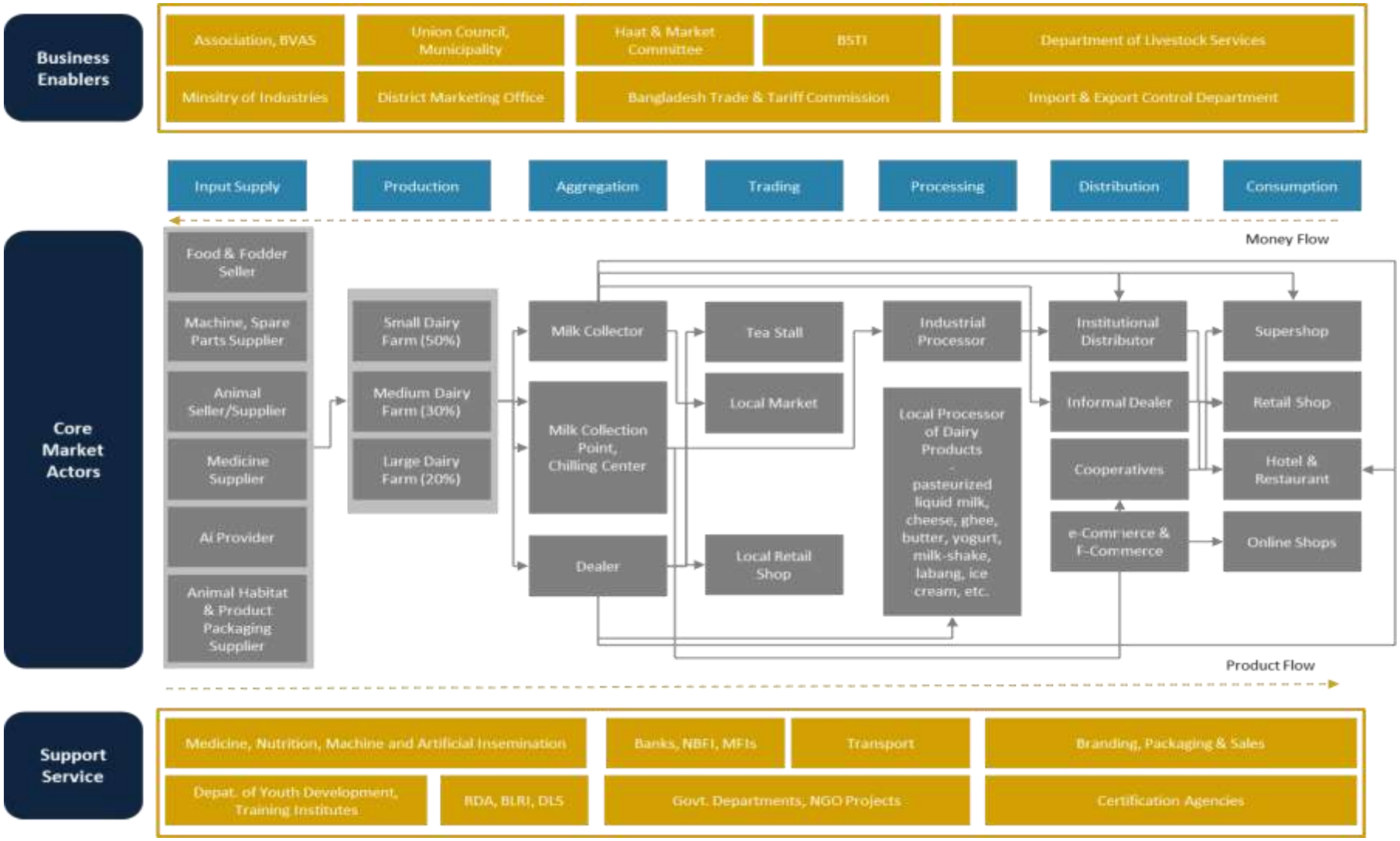
For aggregation segment, it is completely male-dominated and women are rarely seen involving in relevant activities. The key reason is that milk collection or cattle trade is a work of strength that men are more likely to be competent. The similar situation works for traditional processing and slaughtering. Only for the family business of sweetmeat making, women play an assistant role in helping their husbands working in the backyard. Currently, more jobs have been provided for women through formal channel. With advanced facilities, the demand for physical strength is reduced which allows more women to be involved in the processing activities. Certain women in senior-level have engaged in business plan making and marketing strategy design. Still, for jobs like veterinarian or transporters, women are significantly underrepresented.

More projects are being brought out to empower women in dairy sub-sector. In some milk zones, the establishment and widespread practices of milk collection centers or chilling centers near villages make it possible for women to go outside the house and sell the milk by eliminating the need to leave their villages. However, for more remote areas, the barriers are still there as they depend mainly on informal collectors who go door to door to collect milk.

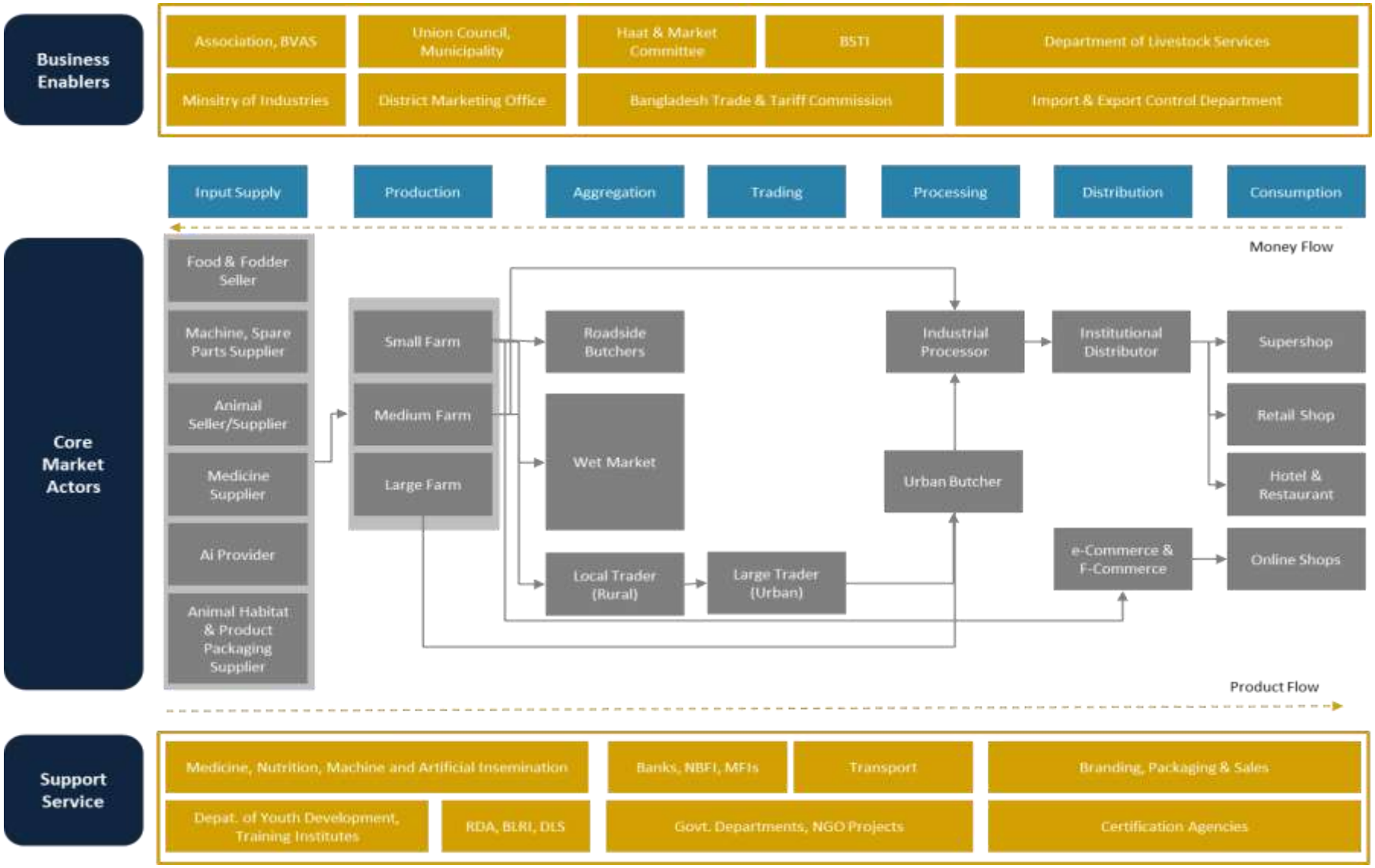
Moreover, more and more women producer groups are emerging. Those are smallholder farmers, who are the major targeting people of different projects of development agencies or NGO. With the help of funded projects, members of the producer groups can directly receive training, inputs and other services such as veterinary services and AI service. Of course, there are some new job opportunities created for women as well. Some work as nutritionists and receive professional training in order to advice group members on nutrition intake and health care. Some women have also become small entrepreneurs who sell inputs and medicines to group members or the village people in order to have extra income. Women in the producer groups have better control of their milk income and more powerful in decision-making.

The Dairy Sub-Sector or Value Chain Map

Milk Value Chain



Meat Value Chain



Market Systems Dimension

Dairy Value Chain Governance

Industrial channel

The value chains in which the industrial dairies are present are quasi-hierarchical. In zones with the presence of industrial dairy collection systems (e.g. Milk Vita, Pran, BRAC, etc.), the majority of farmers are dependent on these companies as the primary large and viable market. The leading dairy companies generally dominate and govern the value chain, whereas a few SMEs are also involved but with limited influence and scale. The intermediate and traditional processors also operate, but represent a far smaller market.

The industrials set prices for upstream and downstream actors in the value chain. This domination by the few industrial firms affects other actors in milk supply chains that do not even supply to the industrial dairies, such as traditional processors, and the informal collectors who set prices in reference to the prices of the industrial dairies. In the primary milk zone, where there is much competition for milk, the informal collectors often need to pay a higher price than the industrial dairies to collect milk, thus making little profit. While in emerging milk zones, with less competition for milk, the informal collectors who supply the traditional processors continue to pay lower prices, as the collection schemes of the industrial collectors do not absorb all the milk in the area and without the traditional processors farmers would be in over-production.

The industrial dairies are vertically integrated, increasing their power in the chain against their smaller buyers and suppliers. Except for primary production, industrial dairies encompass the rest of chain segments from collection, processing, distribution, marketing to retailing. As major processors for value-added products, dairy companies capture the most value with higher quality and food safety standards.

The industrial dairies define the milk quality, setting a scale for price linked to fat content, which they change during the year to create incentives for farmers to supply more milk, or to discourage farmers from supplying more milk than the company can process in the flush periods. The industrials have far more knowledge and operational capability, and share this with downstream actors to enable farmers and collectors to supply milk meeting the companies' requirements.

About the downstream, the industrial dairies in general have own distribution networks and retail shops.

Traditional chain

Dairy farmers are the most numerous and weakest of the value chain participants in the traditional milk supply chain. In the traditional milk supply chain, the milk collectors are key actors who link farmers to the market. Hence, collectors have the most influence on pricing and product quality. In the secondary and emerging milk zones, the collectors set the prices at which they collect raw milk from farmers. The price can be very low (30TK/L or lower) in areas where the industrial dairies are not established, or where milk is in high supply. The quality of raw milk is low, sometimes adulterated, without any governing standards.

When the raw milk flows to the traditional processors, there is a wide range of prices in sweetmeats. The prices generally depend on regions, varieties, even sellers (with longer history or better reputation). The processors can adjust the prices of the final products and gain the highest margins and income. To ensure milk supply, many of the sweetmeat makers have collectors as their employees, or independent collectors who work primarily with them. In this case, the market power shifts to the sweetmeat markers who have more influence on the price setting. In milk zones, the traditional processors face significant challenges because the farmers and collectors gradually shift to the industrial dairies to get a fair payment based on the milk test. To maintain a long-term relationship, the processors sometimes have to offer a higher price than the industrial dairies, which increase the cost of production.

However, the sweetmeat makers sometimes are tricked by the collectors by receiving adulterated or diluted milk. They are unable to protect themselves from such cheating, resulting in a decline of value captured. Due to a lack of laboratory tests and quality standards, the negative impacts are visible. Farmers are not incentivized to produce better quality milk and processors are depressed by the low-quality product.

Often the sweetmeat makers are also retailers. In this sense, the midstream and downstream is vertically integrated as the processors own the connection with the end-market. The targeting consumers are residents, hotels and restaurants.

Horizontal linkage – organization and business associations

Milk producers, in general, are unorganized and fragmented. The organized group started with Milk Vita cooperatives. In recent years, there is a growing number of producer groups supported by NGO or funded projects but on a limited scale. There are no independently functioning producer groups in dairy sub-sector.

In terms of collectors and traditional processors, there are no association or business groups, which integrate these actors. They function as individual or family businesses. With limited bargaining power, they are also the most neglected value chain actors who have barely received any training or technical and policy support. Without associations or groups that enhance their power, these small and fragmented actors lose any ability for segment organization or representation in bargaining or advocacy with the government, lead firms or the actors in other value chain segments.

For industrial dairies, they form a business association through which they attempt to influence the government on policies that would benefit their businesses, such as raising the tariff on imported milk powder. Compared to individual traditional processors, industrial dairies are more influential in conducting policy dialogue and making their voice heard by the government.

Meat Value Chain Governance

Vertical linkage

Bull fattening is mostly dependent on the dairy industry, meaning that small-scale farmers make up the majority. They sell either bull calves, which they cannot keep, or old cow no longer producing milk. In this case, farmers make a small income from the cattle sale and they are generally trying to recover value before it is lost. Some large-scale bull-fattening farmers usually have better capabilities. With strong capital invested, they can better assess services and market information.

Cattle traders have the most power in the cattle supply and trading for beef consumption, particularly for Eid. To be more specific, large traders take advantage and balance support and demand gaps by moving cattle all around the country, while small traders operate in a particular area where they have the flexibility and look for opportunities. Cattle traders are generally price setters and capture the most value in the supply chain of live animals. They only own the cattle for a short time and can adjust the quantities according to the market demand. They can choose the best purchasing timing when the selling market is good (e.g. Eid). If the time to buy is not ripe, they are not forced to do so. Traders evaluate the animals based on their breed, size, age as well as other characteristics and prices are set accordingly. The margin for each cattle is not very high but traders make huge profits through large quantity and high frequency of transactions.

Butchers usually purchase cattle from the nearby market or fixed suppliers (farmers or traders). Live animal purchase accounts for more than 75% of their total revenue.

Horizontal linkage

There is almost no organization or producer group for bull-fattening farmers. Only one works with Bengal Meat with support of a local NGO. The whole segment is very fragmented and vulnerable as farmers have low bargaining power and are price takers. Similar to traders, they generally work for their own without any formal organization. Some informal groups exist but they are quite marginalized.

The situation has been changed for butchers as a national association has been founded within Dhaka city– the Meat Traders' Association. Each major city has a meat traders' association, which groups butchers and works with City Corporation for cattle slaughtering. The Meat Traders' Association has achieved some breakthroughs for its members, such as promoting digital weight machine and providing training to raise their awareness. In spite of that, the association still has very capacities in well-delivering knowledge to butchers. The most urgent issue is to improve the slaughter facilities, but the whole process is advancing slowing because of limited resources and scale.

By-products Value Chain Governance

Hide and Tannery

The linkage between butchers, hide collectors and tanneries is quasi-hierarchy. Tanneries play a dominant role, which set the prices and control the demand for hides. The vast majority of the tannery output is exported, but most of the tanned hides are not certified due to environmental problems.

Large hide collectors are also powerful but have market dependence on the tannery sector, where the sales are concentrated. When tanneries are being shifted to the new location, the demand is massively restricted, resulting in a sharp decrease in hide price and quantity collected.
Butchers are the least powerful actors in this supply chain as prices are usually set by tanneries and collectors. For butchers, the sale of hides is an important income element but they are the most vulnerable actors affected by the price. In addition, the lack of slaughtering skill resulting in lower quality of hides also decreases their revenue.

Bone supply chain

The bone supply chain is dominated by one lead firm, Global Capsule. The company set prices for chipped bones based on its need and inventory of bones. The chippers and different levels of collector fulfil a basic function and follow the pricing structure defined by Global Capsule. For butchers, the bones that cannot be sold with meat have no particular value. However, in recent years, urban butchers have a growing awareness to sell the unused bones to the collectors. Although the profit is not much, it is still a benefit for them.

Feed supply chain

The supply of feed ingredients and ready-made feed, either locally produced or imported, is dominated by feed companies. The feed companies set the prices in the downstream segments using the Maximum Retail Price (MRP). The profitability of the animal feed prices depends on the market price of ingredients. The distributors/sellers are very powerful. For example, for poultry sub-sector, the distributors are intermediaries who dominate the supply of both feed and DOC. However, they are still entirely under the domination and contractual responsibilities to the feed companies. Farmers are general price takers; the current high price of animal feed contributes to a high rearing cost, which undermines their profitability.

Overall Competitiveness

The end-market analysis shows that there are no great end-market gaps in dairy and meat. According to government, or by WHO recommendations, there is a quantitative market gap in milk, but according to the real demand of the population, based on cultural habits, preferences and behavior, there is no evident gap. Demand could grow slowly with increasing purchasing power, but the market gap is not huge as expected. Apparently, there are no unseized market opportunities as the entrepreneurial and business culture in Bangladesh is strong that any appeared opportunity will be taken (even like bones and hides). For the market that not yet mature, companies are trying to take as well. For example, Bengal Meat is targeting a niche market even though only very limited population (more middle class) can really afford it.

As regards the traditional dairy products, a huge number of producers and products existing in the value chain. Apart from the common types, there are some well-known products in particular areas, or even in particular shops. In addition, some more innovative sweetmeats are emerging to enrich the varieties. While for the industrial processing products, the mainstream products are generally pasteurized milk, UHT milk and curd. Some product innovations have attracted new market share but become mainstream (such as flavored milk). The European style cheeses are also produced, but in a limited scale, as they do not meet cultural tastes and local purchasing power.

In terms of meat, the informal meat sector shows a strong presence as the population prefers. There is a large number of roadside butchers, wet markets, and micro-markets across the country where the majority of people purchase meat. However, consumers are more or less satisfied with the meat quality and not asking for better products. The formal meat sector is very small and not favored by the majority. Only middle or upper class people with a better income would prefer to consume. However, the increasing understanding of food safety in the population, matcher with increasing incomes, could create a demand gap for safe and quality meat.

The national market is very competitive with a large number of actors involved in the industry. However, dairy is undermined by a low global price of powder milk, which affects a lot the domestic production, as processors prefer to use cheaper powdered milk instead of raw milk. The beef market is relatively isolated but affected a lot by smuggling activities. In the global market, the whole dairy and meat sub-sectors still have low competitively in terms of quality and quantity, particularly compared to neighboring countries like India.

Sustainability Performance

Economic sustainability dimensions

In dairy sub-sector, farmers are mainly price-takers resulting in a relatively low profit. But the situation varies. Dairy farmers in urban and peri-urban profit more as the price is much higher due to its close distance and huge demand in metropolitan cities. Farmers generally have limited bargaining power so that they can only passively take whatever price is set by their buyers. Collectors have better profit margin (<20%) than farmers in less developed areas as they are price-setters; while in major milk zones, it’s less profitable as the prices are mostly controlled by industrial dairies or large sweetmeat

makers. Traditional processors generally have a profit margin of 28%. By producing diversified value-added products, the processors are the actors who benefit the most from the whole dairy supply chain.

As regards meat sub-sector, there is a significant seasonality influence. The profit margin for each value chain actor reaches the highest during the Qurbani period. As there are few farmers are completely involved in bull fattening, they capture less value by providing low-quality bulls. The business of peri-urban and urban for butchers are more profitable than other districts. The majority of butchers have a small profit margin, around 1%-8%.

For both value chains, the actors with considerable incomes capture the most value, such as industrial processors, traditional processors, cattle traders and the processors in the hides and bones value chains. They either produce a variety of value-added products, or play a dominant role in controlling the transaction. Meanwhile, from the consumption perspective, consumers require more affordable products with high quality. Under the current situation, as margins are minimal in both dairy and meat value chains, so the objective is mainly to improve the quality of products rather than making products less expensive. However, a drastic increase in prices will also not be possible in any case as the vast majority of consumers do not have high purchasing power.

Furthermore, in terms of the government revenue, in the existing value chains, only traditional processors, SMEs, industrial processors as well as downstream value chain actors pay taxes, at least VAT. Cattle traders and butchers often pay market taxes, while farmers and small-scale and entrepreneurial milk collectors do not pay any taxes. Therefore, an improved and more profitable value chain would result in an increase in government revenue.

Despite the fact that the value is captured differently throughout the value chains, none of the upgrading principles would lead to any one group winning increased value capture at the expense of another value chain actor. The increase in value capture would be based on reductions in cost, particularly for farmers and traditional processors; particularly the fragmentation of the production sector should be changed with an improvement of the services provided. In this way, dairy farmers are more powerful in choosing the buyers providing a reasonable price and at the same time reduce the production costs. Meanwhile, the collectors who have gained money by adulterating or diluting milk will not be able to profit as it used to be if traditional collectors are able to perform laboratory tests and protect themselves from such adulteration, resulting in improvement in quality. Even though the support to the traditional value chain could be thought to threaten the industrial dairy value chain, it will not as the power balance and actor concentration is so unequal, and the targeted product markets are relatively different.

Social sustainability dimensions

Nutrition

Bangladesh is among the countries with the highest rates of malnutrition in the world. The prevalence of malnutrition affects mostly children and women. According to FAO, “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”55. Bangladeshi children and women, particularly for pregnant and lactating women, are suffering micronutrient deficiencies. Improve access to dairy and bovine products with affordable price is one of the most efficient ways to ensure the nutrition intake and diversify the diet. The dairy and bovine products can provide a verity of essential nutrients include Vitamin A, calcium, phosphorus, protein, potassium, sodium, etc.56 in an easily absorbed form to keep body function properly. For children particularly, milk-based products can be essential for their growth and cognitive

development. In this sense, enhancing the development of Bangladesh dairy and beef sub-sectors will contribute substantially to improving the nutrition status of the population. However, compared to beef, the consumption of milk and dairy products is far beyond the adequate amount. This is not only due to a national wide low milk production, but also because of low awareness and inadequate education of the importance.

Food safety

Food safety issues exist all along the dairy and beef value chain. Even though more and more consumers are aware of the importance to access safe food, they are still not able to identify what safe food is. Due to a lack of transparent traceability system, consumers have difficulties in obtaining enough information in order to judge if the production and processing of certain products have met the standards. In Bangladesh, due to huge demand, the supply of dairy and bovine products can directly affect public health.

Food contamination from raw meat is an important cause of food-borne disease outbreaks or food poisoning due to improper handling. During production, processing, and storage, these products are subjected to contamination by pathogenic bacteria. For meat products to comply with international standards of quality and safety, one must constantly monitor the hygiene and quality standards in the handling and processing environments of meat products. Most meat is handled under unsatisfactory sanitary conditions in both rural and urban areas. Modern restraint devices are not available in local slaughterhouses. There is no application of humane slaughtering methods in Bangladesh, and animals who are transported to slaughterhouses are not subject to any legal restrictions, so slaughter depends on the expectations of the local slaughter men and slaughterhouse owners/managers. Slaughter in open markets or even in disorganized slaughterhouses results in extremely unhygienic practices for disposing of blood, viscera and other wastes.

The slaughtering and dressing of food animals take place in a disorganized way and unsanitary conditions in the country. There are many self-made field abattoirs in rural and urban areas, small towns and even in cities where slaughtering of cattle, sheep and goat by unauthorized butchers in roadsides, fields, bushes, backyards or at house premises. Absence of effluent treatment plant in slaughterhouses owned by the city government is another major concern for environment safeguard. Usually, the animal traders purchase the animal from the local areas and sell them to the urban markets. Butchers purchase the animal from the animal market and slaughter in the primitive slaughterhouses. Butchers act as meat trader both in local and urban areas without concerning meat safety. The finished products are transported to meat shops by rickshaw or open van and exposed to health hazardous agents.

05 SYSTEMIC CONSTRAINTS

05. Market Systems Constraints

Key Systemic Constraints

The sub-sector assessment considered identification of constraints in a manner that hinders the sector growth and market development opportunities. While doing so, constraints were identified in six (6) thematic groups.

SL	Areas of Key Constraints	Description/ Problem Statement
1.	**Access to Livestock Services**	Lack of improved and modern livestock services led to high frequency of cattle diseases and low per capita meat and milk production.
2.	**Access to Feed & Fodder**	Unavailability of quality concentrated and green grass resulted in low production and reproductive performances of animals.
3.	**Farm Mechanization**	Lack of modern farm management technologies increases the cost of milk and meat production and hinders the scope for commercialization of farms.
4.	**Products Marketing**	Absence of dairy mechanization, product diversification and certification, branding and supply network caused less number of large buyers interested to source milk and meat from locality.
5.	**Production & Marketing of Safe Meat**	Lack of knowledge on safe animal husbandry practices hinders commercial growth and market linkage opportunities with premium buyers for the locally produced animals.
6.	**Access to Finance & ICT**	Limited access to financial and ICT services resulted in poor business management and poor business growth.

Key Constraint: Access to Livestock Services

Lack of improved and modern livestock services led to high frequency of cattle diseases and low per capita meat and milk production.

Root Cause: Insufficient supply of quality semen, medicine and vaccine

Supply of insemination services to maintain fertility and milk production is lower than the demand. Sometimes AI and exotic genetic material are used synonymously, which leads to substandard cattle rearing with lower disease resistance and health hazard. There are also shortage of vaccines & medicines, especially in the remote locations where service providers do not reach and retailers do not operate.

Root Cause: Insufficient number of service providers
The assessment found that the number of service providers, both govt. and private sectors are insufficient and do not frequently reach the dairy and meat producers. Especially, AI services are limited from local DLS office. Some private sectors and NGOs run AI program, BRAC especially has more coverage, though they do not reach the wider producers when the service is needed.

Root Cause: Lack of knowledge of the service providers
Though there are limited number of services providers in the dairy sub-sector in the project location, they do not have appropriate knowledge and skills to provide the services adequately. Especially, dealers and retailers when selling medicine and vaccine have poor knowledge on the doses and applications of various medicines which results in wrong prescription of medicines. This only increases producers' cost for medicine, as they frequently have to purchase and overdose. The wrong prescriptions often lead to high mortality and poor production of milk and meat.

Key Constraint: Access to Feed & Fodder

Unavailability of quality concentrated and green grass resulted in low production and reproductive performances of animals.

Root Cause: Lack of knowledge of dairy farmers on fodder cultivation
Most of the dairy and meat producers do not know about fodder cultivation because of poor information access to enrich technical knowhow. High yielding fodder like Napier, Sorghum, Jumbo & German contain high nutritional values which increases milk production of a cow by several times. Producers have a perception that cultivation of high yielding variety fodder is not economic and more expensive whereas the scenario is opposite. Hence, lack of knowledge on fodder cultivation and its economic benefit leads to scarcity of quality fodder and results in low dairy productivity and reproductive performance of the animals.

Root Cause: Insufficient land of dairy producers for high yielding fodder cultivation
Producers mostly represent the "*poor*" and "*middle income*" based on the asset distribution or wealth ranking. About 34 percent producers are "*poor*" and 37 percent producers fall in "*middle income*" category. They do not have sufficient (or additional) lands so that they can cultivate high yielding fodder. Secondly, about 61 percent dairy producers in the study location have animals ranges from 1-4. For this little amount of cattle, producers do not find it economic to go for fodder cultivation in their own land.

One the other hand, the landowners are not willing to provide their land for fodder cultivation. Instead, they provide lease mostly for rice, maize, wheat, onion and potato cultivation. Major underlying reason for this lack of land is that the landowners do not know the profitability of high yielding fodder cultivation. This lacking leads to unavailability of green and therefore the cattle are poorly fed.

Key Constraint: Farm Mechanization

Lack of modern farm management technologies increases the cost of milk and meat production and hinders the scope for commercialization of farms.

Root Cause: Absence of modern farm management technologies

Thought he country's dairy industry has advanced, the farming sector in Bogura has yet to get benefited from the emergence of agricultural mechanization, the machinery equipment that help producers to control many processes such as reduce waste and increase cattle-labor ratio. Contrary to smallholder dairy farming, producers mostly uses the labor of his own self or available family labor with limited skilled. The small holder producers are common to a traditional practice such as cows milked and forages harvested by hand, it causes they have only a few cows. Maintaining such practices could not support farmer to enlarge their farm size, cause the labor-cattle ratio relatively high and increase cost of production in the end.

Root Cause: Lack of proper knowledge of farmers on milking management

Marginal dairy producers do not have proper knowledge on milking management. However, it is an important issue of dairy management but these producers are not well trained to manage their farm effectively. Due to this lacking, firstly they do not milk their cows on a fixed time regularly. This irregularity affects the cows' capacity of milk production. Gradually, milk production decreases.

Secondly, after milking they do not take care of their cows properly. After milking, the tired cows lie on the floor. As teat canals remain open for two hours after milking, dust and bacteria enter into teat canals, which infect the teats. The infection is called mastitis. It results in decreased Casein, the major protein in milk, and higher somatic cell counts that lower the milk quality.

Key Constraint: Products Marketing

Absence of dairy mechanization, product diversification, certification, packaging, brand, sales service and supply network caused less number of national buyers interested to source milk and meat from locality.

Root Cause: Lack of storage facilities for milk traders (milkmen, milk collectors, traders)

The assessment found that there is limited number of storage facilities to support the producers, milkmen and milk collectors. Besides, there is no small-scale storage facility where the milkmen or the milk collectors can store milk for a certain period of time especially when there is a rain or flood or over-fogging condition. This leads to lower access to market including large bazaar, processors and chilling points. Producers are therefore forced to sell milk in the most nearer bazaar or next to their neighbors.

Root Cause: Absence of cool chain management increases losses during transportation

Because of the perishable nature of milk and meat, both poses a high risk of expiration and spoilage. Especially milk is very much vulnerable to the traditional transportation system where a proper cool chain management is absent. Cold chain of milk starts from the farm. After lactating, milk should be preserved in the cooling tanks to reduce its temperature to 4°C and then only the chilled milk is

transferred to the chilling/processing plant or to market. The sub-sector assessment did not find presence of small-scale cool chain facilities or refrigerated vehicles that could support market linkage to large institutional buyers of milk.

Root Cause: Lack of skills and technology for milk processing
The many ways in which milk can be processed - into cheese, yogurt, and cream – can also address the risk of spoilage due to absence of coil chain. While this offers an opportunity for additional revenue, but processing requires different knowledge, skills and technologies, especially each processed dairy item for example yogurt requires different set of skills and equipment than the one making the cheese.

Producers are neither aware of such technology nor they have the capacity and required skill set to process milk into other products/ by-products/ value added products.

Key Constraint: Production & Marketing of Safe Meat

Lack of knowledge on safe animal husbandry practices hinders commercial growth and market linkage opportunities with premium buyers for the locally produced animals.

Root Cause: Lack of improved breed results in low profit at farms' level
Only 30-35% of breed fattened in the study areas is of improved origin. Local breed lacks the expected growth. Fattening households also does not pose appropriate knowledge and benefits of improved breed. Usually, calves are brought from market places (there is shortage of improved breed calves in the local market as well). An improved breed of Frisian may cost as much as BDT 30,000. Many of the producers do not have the ability to purchase calves and leave without choice to buy a local breed.

Root Cause: Lack of proper fattening knowledge especially on the feeding technique
Lack of technological development exists at SME level of Bogura. Producers still practice traditional methods for fattening and rarely use improved feeding. There is limited practice of ready feed usage (one of the reasons they cited is the cost of ready feed is high). Poor feed management results in lesser growth of the cattle.

Root Cause: Lack of awareness on safe meat production
Some are involved and encouraged to do malpractice of using steroids for fattening, which is harmful for human body. Lack of ethical education, awareness about the demerits of using steroids and alternative methods of fattening restrict producers in accepting ethical rearing practice and trying to influence quicker growth of the animals.

Key Constraint: Access to Finance & ICT

Limited access to financial and ICT services resulted in poor business management and poor business growth.

Root Cause: Lack of specialized source of finance for the dairy farmers

Most of the producers surveyed are either extremely poor or moderately poor to boost up their way to earn livelihood with their own capital. Whenever they require arranging capital, they go to the local mohajons to borrow money with high interest rate rather than going to financial and microfinance institutes with lower interest rates. Sometimes this interest rate (of mohajons) goes up as high as 30-35% of the borrowed amount (principal). The only reason they do not prefer to borrow from formal sources or banks is the complexity and lengthy process of borrowing money. Borrowing from formal banks also needs proper documentation and business record keeping; majority of the producers do not maintain such documentation or record keeping of their dairy business.

Hence, the lack of specialized sources of finance (with easy terms & procedures) forces farmers to maintain their small-scale farm with limited capital. This is compelling them to feed their cows with less and poor quality feed, take improper care of their cows like giving no/less vaccine, de-worming, and medicating on time only because of their limited allocation of money to maintain the farm. The ultimate result of the above stated situation is low productivity of dairy farmers.

Root Cause: Lack of knowledge of producers to use ICT services to receive information on better management practices

Use of ICT-based information and extension services can address the challenge of low farm productivity and improve production performance of the smallholder farm households. ICT can be used to learn about better farm management practices, get market information, get information on latest technologies, information on weather and disaster forecast etc. Receive of timely information with a minimum costs can boost farm's performance, economically and socially. Producers lack knowledge of using such ICT portals or mobile applications. Service providers also lack ICT means to disseminate information and extend dairy services to the producers.

06 INTERVENTIONS

06. Intervention & Investment Strategy

Value Chain Upgrading: Core Strategies

By 2024, more small-scale producers and other value chain actors will produce dairy and beef products of a higher quality and value, leading to improved profitability for actors in each segment, a safer supply of affordable food to the population, and greater value chain sustainability.

Specifically:

The ***industrial channel of the dairy value chain will expand*** to include an additional 15,000 small-scale producers. They will operate with improved farm management capabilities, and producers will be incentivized to provide quality milk to collection centers. Public-Private Partnerships can provide a well-coordinated "feed-for-milk" scheme, which will reduce the production costs of rearing cattle, without significantly altering the marketing mechanisms or cash flow of farmers. These improvements in the industrial dairy value chain will achieve sustainability by ***engaging private sector partners*** in business operations, while being inclusive of small-scale producers and eliminating the potential negative environmental impacts.

The actors of the traditional channel of the dairy value chain will produce higher quality and safer products for Bangladeshi consumers. Over 4,000 traditional processors need to be trained to use improved processes, and provided access to processing tools and technologies, equating to upgrading nearly 4% of the traditional processors in Bangladesh each year. ***Business Development Service providers*** such as training institutions will have the opportunities to develop and offer formal courses and curriculum on dairy and dairy processing. They will work in perpetuity to continue ***upgrading the processes and technology of traditional processors***, who will continue to incentivize other value chain actors to provide higher quality and higher value milk.

The actors of the ***beef value chain*** will produce a higher quality and ***safer fresh meat for consumption***. To meet the increasing demand, slaughter facilities have to established/updated that will enable slaughters/butchers to provide meat to consumers, which complies with basic food safety standards, The upgrading of slaughter infrastructure in Bogura will provide a model which can be replicated in other slaughter facilities, also impacting other livestock value chains.

Additionally, at the systemic level of the value chains, ***food safety monitoring*** should be strengthened to reinforce the upgraded processes used by the traditional dairy and beef value chain actors, with a ***certification of food safety and traceability*** signifying the improvements in process and product quality. Further, consumers of these products in urban areas will know the characteristics of safe dairy and beef products, and use the market power to demand safer products from processors and butchers, and thus create incentives for a sustainable dairy value chain upgrading.

In summary, the core strategies to upgrade the dairy (milk and meat) value chain should include the following approaches.

a) ***Expanding access to the industrial dairy value chain:*** The project should take integrated intervention with focused upgrading in the primary production, aggregation and industrial processing segments of the value chain to instigate more quality production and systematic marketing of milk and meat. The strategy should focus on boosting milk output and creating market systems for more farmers, using the quality approach and better practices of the industrial value chain actors. The strategy would be developed based on interlinking of the producers, collectors, a larger collection hub to secure milk in volumes large enough to interest industrial buyers, and a capacity at this hub to produce pasteurized milk in bulk or retail packaging.

b) ***Increasing quality in the traditional dairy value chain:*** Improve the capacity and technology used by of the traditional dairy processors of sweetmeats, curd and ghee, which will influence suppliers to increase the quality of milk supplied and reduce adulteration, while also providing a safer and higher quality product to consumers.

c) ***Increasing quality in the beef value chain:*** Improve the infrastructure and machines of the slaughter facilities, and the capacity of the slaughters and butchers to increase the quality and safety of meat available to the population.

Proposed Interventions for Systems Change

As the Sub-sector Assessment identified the key constraints to dairy, milk and meat sector in six groups or thematic areas, the interventions proposed for systems or systemic changes are thereby grouped in the same way. Following are the six key intervention areas proposed by the study.

SL	Areas of Key Interventions	Key Intervention Statement
1.	**Access to Livestock Services**	Create access to improved and modern livestock services by developing LSPs for improved animal health and productivity.
2.	**Access to Feed & Fodder**	Increase production and reproductive performances by strengthening the supply network of high yielding fodder, silage and ready-feed through local suppliers.
3.	**Farm Mechanization**	Engage relevant private sectors for strengthening the supply chain of machine and equipment for farm mechanization.
4.	**Products Marketing**	Develop industry-grade dairy products through modernization of small processing units and strengthening its supply chain through promotional activities and linkage with national/premium markets.
5.	**Production & Marketing of Safe Meat**	Promote contract farming and sub-contracting business models to adopt good husbandry practices for producing safe meat.
6.	**Access to Finance & ICT**	Create access and usage of advanced financial & ICT services for better transformation of livestock enterprises into profitable business.

(1) Key Intervention: Access to Livestock Services

Create access to improved and modern livestock services by developing LSPs for improved animal health and productivity.

Develop and train Local Service Providers on veterinary education

At least a 30 percent in increase in cattle production would be possible if the diseases are properly controlled. The vaccination program of the Department of Livestock (DLS) is limited. The animal health services need to be improved at every level. By developing Local Service Providers (LSPs), both livestock services and supply chain of vaccines and medicines would be improved. By upgrading the veterinary education and training of the LSPs and dairy producers, the overall sectoral performance can be increased. LSPs can provide instant and immediate services to the producers and thus the producers can decrease economic loss addressing cattle health, growth and overall disease management.

Establish Veterinary Service Point at the local level

Other than developing the LSP network, it is recommended to establish One-Stop Service point to provide improved veterinary services to the rural producers. Such development or establishment may include establishing Vaccine Hub and Vet Lab. This would create opportunities for both public services and private sector to combine and provide a uniform service to the rural dairy producers through a viable business model. The Hub can be linked with the LSPs to provide wider coverage and thereby sustaining the LSP network by securing enough business incentives for them.

Proposed Activities	Private Sector Engagement Plan
1. Develop capacity of the LSPs on vet service, entrepreneurship and business management **2.** Establish Vaccine Hub Vet Service Point with joint collaboration of DLS and interested private sectors (input companies) **3.** Provide improved AI service for high milk and meat purpose **4.** Introduce AI services for goat, sheep and buffalo **5.** Develop curriculum on Bangla GAP (Good Agriculture Practices) **6.** Develop Master Trainers on BGAP **7.** Provide training to producers on BGAP	***Input Companies:*** Renata, One Pharma, ACI, LalTeer, BRAC ***Training & Certification:*** SGS, CVASU, GAP Assurer ***Vaccine Service:*** DLS, Bangladesh Veterinary Association (BVA)

(2) Key Intervention: Access to Feed & Fodder

Increase production and reproductive performances by strengthening the supply network of high yielding fodder, silage and ready-feed through local suppliers.

Increasing producers' capacity on fodder cultivation and feed preparation through DLS and seed companies

To increase the capacity of dairy producers (milk and meat producers) on fodder cultivation and feed preparation technique; the project can facilitate workshops, training, farmers' meeting, demonstrations plots etc. under this intervention. DLS in association with seed companies can initiate these activities. Besides, linking seed companies (especially for maize cultivation) with the producer groups for conducting these activities will ensure that the producers know proper cultivation technique of high yielding fodder (Napier, German, Jumbo, Sorghum etc.) and preparation of feed (UMS, UMT & UMB).

Promote contract growing of fodder seeds through seed companies

To increase the cultivation of high yielding fodder seeds, DLS can make contract with seed companies. This contract will boost up the production of high yielding fodder seeds both publicly and privately which will ensure sufficient supply of fodder seed to the dairy producers. Seed companies can buy or borrow scientifically produced fodder seed from DLS research laboratory and do their production and marketing under their own brand of fodder seeds to complement production and supply of fodder seed by the public sector.

Promote usage of cattle feed through cattle feed supplying companies

Cattle feed supplying companies can be engaged with the information dissemination and embedded services of cattle feed to its users by organizing workshops, developing information hubs/centers and other promotional tools, to inform he dairy producers about the benefits of using cattle feeds as well as its proper preparation procedures. It will encourage the farmers to use cattle feed more and in a proper way for the development of their livestock's health and milk production.

Promote easy leasing facilities of khas & privately owned lands for fodder cultivation

Platform for leasing privately owned lands can be established through a Local Land Lease Committee formed from the producer group itself who will work as the arbitrator in case of land leasing. The committee can keep track of the available lands in the area. The committee can facilitate a short-term leasing in such condition that, the owners will take the money and let the other farmers cultivate for two seasons on which the owners will have no authority. After the mentioned time, the owners get back his ownership with the need of immediate capital solved. On the other hand, the farmers with some extra cash in hand can work on more land and gets benefitted by cultivating legumes, maize and other high yielding grasses. This intervention can specifically benefit female producers because majority of the time even if they get credit from MFIs, they cannot properly utilize it. Besides, NGOs can introduce and or refer this Land Leasing Committee with the local AC Land office (Assistant Commissioner for Lands) for liaison to leasing khas lands.

Proposed Activities	Private Sector Engagement Plan
1. Develop local suppliers of feed and fodder such as dealers, sub-dealers and retailers 2. Train LSPs on fodder cultivation and feed preparation 3. Conduct Field Demonstration on ready feed, green grass, silage, UTS and UMS 4. Conduct feed and fodder marketing and promotional activities jointly with DLS and seed companies 5. Develop social media marketing plan to promote and create access to improved feed and fodder for livestock	***Input Companies:*** Nourish, ACI-Godrej for ready feed LalTeer, ACI Seed for seed, sweet jumbo RDA & Northern Hatchery for grass cutting Silage Supplying Company ***Technology Provider:*** Agriculture Universities (i.e., seaweed) ***Promotion & Advocacy:*** DLS, BLRI

(3) Key Intervention: Farm Mechanization

Engage relevant private sectors for strengthening the supply chain of machine and equipment for expanding farm mechanization.

Develop and train dealers, sub-dealers, retailers and LSPs on farming machine

Productivity can be increased by up to 40 percent if the dairy farms are transformed with proper mechanization processes and equipment. Curriculum should be developed on various machine and equipment that foster dairy farms' productivity and train the dealers, sub-dealers, LSPs and dairy producers on use of farm machine and equipment. Training on equipment servicing also can be provided through local vocational training institutions to ensure after-sales service.

Establish Farm Mechanization Service Points at the local level

Other than developing the LSP network, it is recommended to establish One-Stop Service point to provide farm mechanization products and services to the rural producers. The Service Points can be established by interested private sectors and in technical collaboration with DLS and BLRI. Starting for product demonstration, product sales and after-sales services, these Service Points will provide 360-degree solution related to dairy farm, mechanization.

Proposed Activities	Private Sector Engagement Plan
1. Develop capacity of dealers-sub-dealers, retailers, LSPs and producers on farming machine and equipment 2. Establish Business Service Point with joint collaboration of DLS and interested private sectors (machine manufacturers and marketing companies) 3. Organize Product Demonstration Sessions to showcase the application, usage and benefits of various farming machine and equipment	***Private Sector:*** Importer and Local Machine Manufacturer such as Trade Global, ATEC etc. ***Research/Technical Partner:*** Agriculture Universities i.e., BAU, SAE, BSMRAU
Possible Technologies for Farm Mechanization (proposed): ▪ *Silage & Fodder Baler machine* ▪ *Chopper, Crushing & TMR Machine.* ▪ *Stall Feeding* ▪ *Milking Machine, Central Chilling Machine* ▪ *Dewatering Machine for waste management for compost production* ▪ *Bio-digester for biogas and compost production*	

(4) Key Intervention: Product Marketing

Develop industry-grade dairy products through modernization of small processing units and strengthening its supply chain through promotional activities and linkage with national/premium markets.

Develop knowledge and skills of dairy producers on production techniques of value added dairy products

Producers can be trained on processing of milk and make other value added products such as ghee, yogurt, cheese, sweetmeat etc. Such value addition in the dairy processed industry will open entrepreneurial opportunities for many dairy farmers, especially for youth and women. Producers will also need to be trained on packaging and branding of these processed dairy products for effective market linkages and to boost sales of processed dairy products.

Establish Milk Collection Hubs and Small Processing Units (milk and meat) at local level

Establishment of milk collection hubs, with milk pasteurizing and packaging capability, will collect bulk volumes of milk in the emerging and secondary milk zones in Bogra, thus managing quantities of milk

viable for inter-regional trade. Such hubs will generate rural and peri-urban value creation, as well as creating quality jobs in rural areas, while eliminating all potentially negative environmental impacts. Depending on the regional milk supply and target markets, the milk collection hubs may be replaced by the launch or expansion of SME industrial processors or processing units, for both milk and meat.

Establish new or additional chilling centers & collection points

For the sake of the growth of local dairy sector, selling of milk in the forward markets has to be ensured. More chilling centers and/or collection points is a solution to this. Industrial processors can start it by establishing more chilling points through interested entrepreneurs in the project areas. Entrepreneurs who have ability & willingness to invest and run this operation may be engaged in this process. Chilling Centers and collection points will facilitate producers to get fair market price, based on the fat content.

Proposed Activities	Private Sector Engagement Plan
1. Develop skills of the producers on milk and meat processing **2.** Establish small-scale processing units **3.** Prepare business plan to commercialize processed dairy products **4.** Facilitate BSTI and HACCP certification to improve marketability, commercial viability and quality of the end products **5.** Create market linkages with industrial processors and institutional buyers through improved packaging and marketing **6.** Develop and promote local dairy products through social media marketing	***Retail Chain:*** Aarong, SWAPNO, Unimart, Agora etc. ***E-commerce:*** Chaldal, Parmeeda, MarGEn, iFarmer etc. ***Institutional Buyer:*** Pran, BRAC Dairy, Akij, Milk Vita etc.

(5) Key Intervention: Production & Marketing of Safe Meat

Promote contract farming and sub-contracting business models to adopt good husbandry practices for producing safe meat.

Create awareness on ethical rearing technique

It is necessary that the dairy producers first stop practicing the ethical ways by not applying steroids and other hormonal medicine for quicker growth. At the same time, they should be provided with alternative production and rearing technology that will give the exact expected growth without compromising the concerns over product and consumer safety.

Create awareness on ethical rearing technique

It is necessary that the dairy producers first stop practicing the ethical ways by not applying steroids and other hormonal medicine for quicker growth. At the same time, they should be provided with

alternative production and rearing technology that will give the exact expected growth without compromising the concerns over product and consumer safety.

Improve the infrastructure and machines of the slaughter facilities and develop capacity of the slaughters and butchers on safe meat processing

There is no one to monitor and ensure basic hygienic standards in the wet markets, where there is currently no slaughter infrastructure, but where very many cattle are slaughtered. Butchers must be trained on hygienic and ethical slaughtering techniques with information on proper chopping and cutting criteria required by the institutional buyers. It is essential that the butchers and organizations involved in the slaughter process become better economically after the intervention than before – to ensure that they are incentivized to continue using the improved practices.

Proposed Activities	Private Sector Engagement Plan
1. Develop skills of the producers on improve breeding and beef fattening techniques **2.** Establish small-scale meat processing units **3.** Introduce varieties like Mirkadim, Pabna, Goyal, Buffalo, Crossbred cattle, BB Goat & Sheep for graded meat and meat cut **4.** Improve infrastructure of existing slaughter houses and establish new points **5.** Facilitate BSTI and HACCP certification to improve marketability, commercial viability and quality of the meat products **6.** Create market linkages with industrial processors and institutional buyers through contract farming model **7.** Conduct policy advocacy to ban unethical practices in meat market	***Retail Chain:*** Bengal Meat, Palli Meat, SWAPNO, Unimart, Agora etc. ***E-commerce:*** Chaldal, Parmeeda, iFarmer etc.

(6) Key Intervention: Access to Finance & ICT

Create access and usage of advanced financial & ICT services for better transformation of livestock enterprises into profitable business.

Access to finance for business expansion and new business establishment

The project shall collaborate with banks and formal financial institutions to introduce specialized financing or financial products for livestock and dairy to offer customized individual loan product, especially to the small-scale dairy producers. The banks or financial service providers can provide loans with unique repayment process, easing the burden of dairy producers for loan repayment. To ensure effective utilization of credit facilities and to increase return on investment, the financial institutions may organize training on cattle business planning and operations.

Create more effective forward market linkages through ICT

Dairy producers are often subject to mistreatments by the forias and beparis. Linking the producers with the festival-based cattle market traders in regional and local market using ICT will create more unique opportunities for revenue increase from the same amount of resources. Training on use of ICT-based technology should be helpful. Producers and small-scale processors can be trained on use of social media platforms such as Facebook, WhatsApp, and YouTube to promote their products and create linkages with forward market actors directly.

Proposed Activities	Private Sector Engagement Plan
1. Develop customized financial products for livestock and dairy market actors **2.** Provide training on financial literacy and business management **3.** Introduce digital apps such as S-Manager or e-Tally for digital record keeping **4.** Provide training on social media marketing	***Financial Service:*** Bank Asia, Prime Bank, BRAC Bank, iFarmer, Bhalo Social Enterprise, Lightcastle etc. ***ICT Service:*** mPower, DataSoft, iSocial, Lightcastle, dNet, Grameen Intel etc.

Photo Credit: **GUK**

Rural Microenterprise Transformation Project (RMTP) is a joint initiative of PKSF and IFAD, which promotes improve livelihoods of the moderate and extreme poor (men and women) in a sustainable manner. The project adopted the strategy of Market Systems Development to expedite the process of poverty reduction. This will eventually increase sales due to the expansion of business, enhancement in productivity due to adoption of technologies and management practice, increase income by micro-entrepreneurs and other Value Chain actors, increase the skill levels of workers, sustainable services, and create wage employment and a conducive sector specific policy environment.

RMTP is being implemented in 5 upazillas of Bogra district by GUK

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