DAIRY VALUE CHAIN IN BARABARDIYA MUNICIPALITY IN BARDIYA DISTRICT

OPPORTUNITIES AND CHALLENGES

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Prepared by

Amar Bahadur Shah
Ram Bahadur Rana
Indeshwar Mandal

Local Initiatives for Biodiversity, Research and Development (LI-BIRD), Pokhara

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Executive Summary

The dairy value chain study was undertaken in Barabardiya Municipality of Bardiya district. The municipality includes four former village development committees of north-western Bardiya and has 15,070 households with a population of 68,012. The main objective of this study was to assess the existing situation of milk production and marketing in the municipality and explore possibility of expanding milk market within and outside the municipality.

The team used value chain approach for this study and visited major dairy value chain actors in Banke and Bardiya districts. The major tools used for completion of the study were secondary literature review and analysis of reports, direct observations of records in collection centres and production units, focus group discussions, key informant interviews with major stakeholders, and rapid market assessment.

Despite 62% households keeping livestock, per household milk production in the municipality was found low (96 litres). The result directly corresponded to low number of productive animals in the municipality as there are only 1.62% cattle and 4.58% buffaloes of high producing improved breed. There are four cooperatives in milk collection business but three of these cooperatives collect milk and supply to Nepalgunj Milk Supply Scheme (NMSS) while one cooperative has recently started processing milk for local market.

The strengths, weaknesses, opportunities and threats (SWOT) analysis of dairy sector in Barabardiya Municipality with special focus on Shubha Laabha Pashu Bikash Cooperative was conducted. Strengths were analyzed and opportunities for increasing milk production and milk marketing were identified. The study team concluded that Shubha Laabha Pashu Bikash Cooperative have the opportunity and capacity to collecting and processing 1,000 litres of milk daily in near future with possibility of increasing the daily milk collection and marketing to 2,000 litres in a few years' time.

The study team have proposed a few short-term (within 2 years) interventions and medium-term (2-5 years) interventions for milk production and marketing. These interventions, if implemented, will make the cooperative viable and help local farmers increase their farm income. An investment plan worth NPR 7,745,000 for implementation of these activities is also proposed.

Abbreviations

AI	Artificial Insemination
BS	Bikram Sambat
DCA	DanChurchAid
DDC	Dairy Development Corporation
DDEA	District Dairy Entrepreneurs' Association
DFTQC	Department of Food Technology and Quality Control
DLSO	District Livestock Service Office
FTQC	Food Technology and Quality Control
I/NGO	International Non-Government Organization
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
MT	Metric Ton
MOALD	Ministry of Agriculture and Livestock Development
NDDB	National Dairy Development Board
NGO	Non-Government Organization
NMSS	Nepalgunj Milk Supply Scheme
RMA	Rapid Market Assessment
TWUC	Tharu Women Upliftment Center
SNF	Solid Not Fat
SWOT	Strengths, Weaknesses, Opportunities and Threats
VAHW	Village Animal Health Worker
VC	Value Chain
VCA	Value Chain Analysis
VDC	Village Development Committee

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1. INTRODUCTION

1.1. Background to the Study

For improving the lives and livelihoods of most marginalized people, DanChurchAid (DCA Nepal), under their resilient livelihoods and sustainable food security theme, have been partnering with Tharu Women Upliftment Center (TWUC) to support Shubha Laabha Pashu Bikash Cooperative in Barabardiya Municipality in Bardiya district. The support to the cooperative has been extended to establishing Chilling Centre allowing the cooperative to collect milk from smallholder milk producers without running the risk of milk spoilage. Consequently, the number of farmers and the amount of milk collected have increased over time thus giving hope that localized sustainable dairy business built around diversified milk and milk products can be developed to benefit numerous smallholder farmers in the municipality.

Local Initiatives for Biodiversity, Research and Development (LI-BIRD), a strategic partner of DCA Nepal on value chain, was entrusted by the latter to conduct an assessment of and present a business case for diversifying Shubha Laabha Pashu Bikash Cooperative's dairy business. A three-member team from LI-BIRD, led by Livestock Expert, with Senior Socio-economist and Agriculturist as team members accomplished the assignment. The team was supported by DCA's Regional Programme Officer – Livelihoods, and Programme Coordinator from the TWUC. The findings and recommendations presented herein the report are based on literature review and report analyses, on-site visits and interaction with cooperative board members, and rapid market assessment (RMA) conducted on 2 – 5 November 2018.

1.2. Dairy Sector in Nepal

Annual milk production in Nepal is 1,911,239 MT and per capita milk availability is 68 litres per year (MoALMC, 2017). Of the total milk produced in the country, 65% is consumed at household level while only 35% is marketed through informal (20%) and formal (15%) sectors. As dairy sector contributes 9% to Nepal's agriculture gross domestic product, it is vital not only to family nutrition and household economy but also to national economy, with direct cash transfer from urban consumers to rural producers through milk business.

The Nepalese dairy industry depends mostly on small milk producers who produce few litres of milk daily, and numerous small processors who collect and process few hundred litres of milk targeting local markets. Except four or five large dairies that process more than 100,000 litres of milk daily, the 2,000 plus milk processors and 1,600 plus milk cooperatives spread across the country play important role in marketing of milk and milk products in Nepal.

The Nepalese dairy industry can be summarized in the following points: 1) Rural farm families keeping few low productive dairy animals are the main producers; 2) Milk producer farmers are organized in milk producers' cooperatives; 3) Many cooperatives collect and process

milk and sell milk products locally; 4) The cooperatives sell surplus milk to large dairies which are very few and far between; 5) The government owned Dairy Development Corporation (DDC) is the largest player in milk market; 6) A national milk grid is established connecting major production areas (Eastern and Central Nepal and terai districts) all big consumer markets; 7) Price of milk and milk products is set by DDC; and, 8) Strong seasonal variation in milk production and demand exist, with production decreasing in summer (lean season) while experiencing glut during winter (flush season).

2. OBJECTIVES OF THE STUDY

The objective of the study was to assess general status of milk production and marketing in Barabardiya Municipality and suggest ways and means to improve the system. The specific objectives of the study included:

- Assessment of present status of milk production in the municipality, and identify ways and means of increasing milk production;
- Conduct SWOT (strength, weakness, opportunities and threats) analysis of Shubha Laabha Pashu Bikash Cooperative in terms of milk production, collection, processing and marketing; and
- Based on the above two, recommend value addition of milk and milk products, marketing opportunities in the municipality and beyond, and investment plans.

3. METHODOLOGY

In methodology section we have included a brief site description to inform readers of the broader geographic context followed by the theory of change and value chain analysis framework that we have used, key data collection methods/tools, and the limitations of the study.

3.1. Description of Study Site– Barabardiya in Bardiya District

The Barabardiya Municipality was created during state restructuring process by merging four former Village Development Committees (VDCs) namely Baaniyabhhaar, Padnaha, Magaraagadhi and Dhadhawaar. According to the municipal profile 2074 BS, the municipality covers an area of 227 km^2 with a population of 68,012 dominated by indigenous Tharu (81.41%). In the municipality, agriculture is the major preoccupation, with 86% households depending on agriculture for their livelihoods. Occupation of about 86% (13,022) of the total 15,070 households in the municipality is agriculture while 62% (9,345) households are keeping livestock for milk and meat purpose (Municipal Profile, 2074 BS). Records indicate that the municipality produces 894 MT of milk annually, which is mostly consumed locally and some marketed to outside markets through four cooperatives. At district level, Bardiya District Livestock Service Office (DLSO) estimates about 40,476 MT of milk is produced annually, with only 7% marketed through 17 small dairies and 19 dairy cooperatives (DLSO, 2073 BS).

3.2. Study Framework – Value Chain Analysis Approach

The Theory of Change that guided the study has overall goal of increased income of smallholder farmers through increased milk production and marketing in Barabardiya municipality (Annex 1). For line of enquiry in the study we have applied Value Chain Analysis (VCA) approach to collect relevant data from multiple sources (Figure 1). Of the major six steps in VCA, the study concentrated on steps 3 to 6, based on the preliminary discussion LI-BIRD team had with DCA Regional Programme Officer – Livelihoods. Though the first specific objective relates to identifying ways and means to increase milk production and productivity, only a fleeting assessment has been made because no interaction or focus group discussion with producer households were conducted during the study. Besides, the terms of reference for the study was to focus on processing of milk to produce diverse value added dairy products and their marketing opportunities within the municipality and beyond.

In each VCA step, we have attempted to analyse the constraints, gaps or bottlenecks that would need to be overcome for Shubha Laabha Pashu Bikash Cooperative's dairy business to flourish. Once constraints or gaps were identified, we have recommended mitigation measures by taking into account the current status of the cooperative, their investment capability and market opportunities for expansion of business.

3.3. Methods/Tools Used During the Study

The study team employed participatory rural appraisal (PRA) tools to elicit relevant information from variety of sources (Table 1). Basically, we employed four PRA tools, namely secondary literature review, focus group discussion, key informant interviews (rapid market assessment), and direct observation. Hence, all the presented information in the report have been derived using the above mentioned tools.

Figure 1 Value Chain Analysis approach followed for the study, 2018

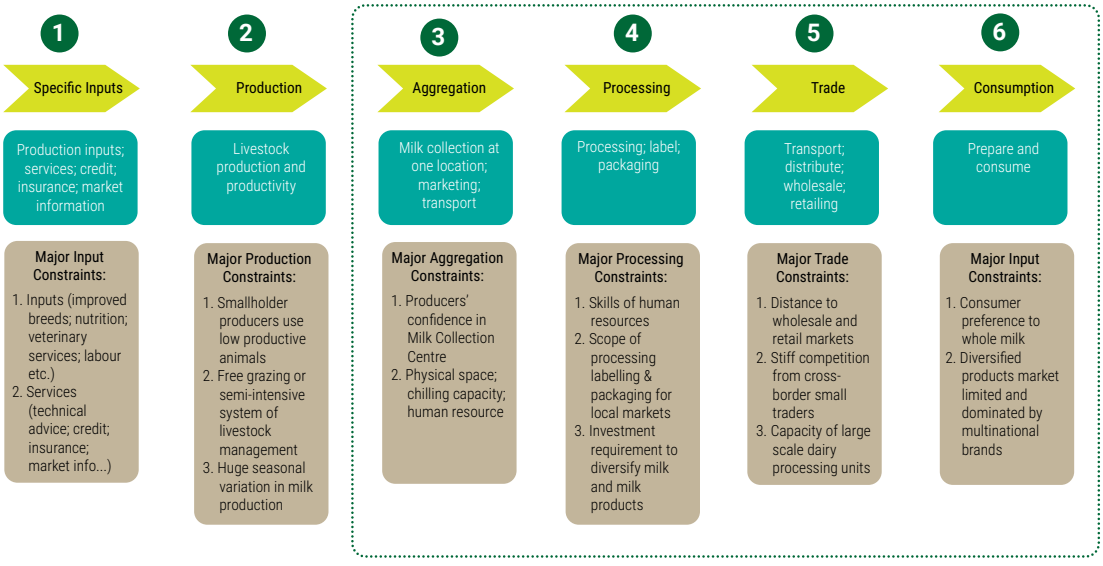

Table 1. Participatory rural appraisal tools used for dairy value chain study in Barabardiya Municipality, 2018

SN	Methods/tools	Data source	Type of information collected
1	Secondary literature review	Nepalgunj Milk Supply Scheme (NMSS); DLSOs; Barabardiya Municipality; TWUC	Status of livestock farming, milk production and marketing in Banke and Bardiya districts
2	Focus Group Discussion	Executive Committee members; General Members of Shubha Laabha Pashu Bikash Cooperative; Staff and Board members of TWUC	Current status of milk production, collection, processing and marketing; future prospect of milk business; challenges and opportunities in the business; future plan and capacity of the cooperative
3	Key Informant Interviews (Rapid Market Assessment)	DLSO – Bardiya and Banke; NMSS; DDEA; Bhagwati Milk Producers' Cooperative; Anupam Dairy	Status of milk production, processing and marketing in local and regional markets; challenges and opportunities in milk business; trend in milk/milk products consumption; scope for diversification; government policies and programmes
4	Direct Observation	Milk collection and processing facilities at SLLDC, Bhagwati Milk Producers' Cooperative, Jaya Bageshwori, and Anupam Dairy	Observed milk collection and processing facilities; pasteurization and paneer making process; milk packaging process; feed and forage seed storage facility; administrative facility etc.

Primary data were collected through focus group discussion with executive board members and general members of Shubha Laabha Pashu Bikash Cooperative. A few major actors of the dairy value chain in Banke and Bardiya were identified (Office in-charge of Nepalgunj Milk Supply Scheme – NMSS of DDC; Chairperson, District Dairy Entrepreneurs' Association, Banke) and information was collected from them using key informant interviews/checklist. Similarly, Chairperson of Bhagawati Milk Producers' Cooperative, Badhaiya Taal-7, Bardiya, and proprietors of Anupam Dairy and Jaya-Bageshwori respectively in Nepalgunj were interviewed and their processing facilities observed during field visit.

3.4. Limitations of the Study

The study team would like to acknowledge that the information and analyses presented herein have been derived from a short field visit (2 – 5 November 2018) and interaction with value chain actors. One of the major actors in the value chain, namely smallholder dairy farmers, have not been exclusively interviewed to understand production constraints. Hence, production-related constraints mentioned in the report have mainly come from focus group discussion and key informant interviews. Related to the production aspects, we are not certain how many Tharu women and youths are directly benefitting from the Shubha Laabha Pashu Bikash Cooperative, and what additional steps are required to

better integrate them in value chain was beyond the scope of the current study. Perhaps those aspects would comprise a separate focused study to address them.

4. FINDINGS

The findings of the study have been arranged in the following order: 1) analysis of value chain actors both in public and private sectors; 2) presentation of value chain functions; 3) major actors involved in milk production; 4) marketing and pricing of milk and milk products; and 5) SWOT (Strength, Weakness, Opportunity and Threat) analysis.

4.1. Value Chain Actors

In any value chain study, once the value chain commodity is identified the most important element then is to understand major actors, in this case, dairy value chain actors both in public and private sector. Unlike food crops and vegetables, in case of dairy business, public sector enterprise, namely Dairy Development Corporation (DDC) is the major actor in the market.

4.1.1. Value Chain Actors in Public Sector

Municipalities/Palikas: In a three tier federal governance system, the municipalities or rural municipalities have taken over the role of the former DLSOs and are now supporting milk producer farmers. In case of Barabardiya municipality, the relevant livestock development office is already offering various extension services and inputs to the farmers.

Dairy Development Corporation (DDC): As mentioned earlier, DDC is the government owned largest milk collector and processor in the country and by far the most important actor in milk value chain. The DDC has presence and operation in the form of Nepalgunj Milk Supply Scheme (NMSS) in this region. The NMSS of the DDC has a factory located at Pipari, Banke with a capacity to collect 15,000 liters of milk per day. Currently NMSS collects milk from four districts through five Chilling Centres and 39 milk producers' cooperatives. The NMSS is connected with national milk grid and is the most reliable buyer of milk in the region.

Food Technology and Quality Control (FTQC) Regional Office, Nepalgunj: The FTQC office regulates food industry including milk and milk products, therefore, permission and certification from this office is mandatory to start milk processing and marketing. Quite often, cottage and small industries fail to acquire mandatory permission and organize regular quality checks leading to uneasy situations while running the business.

4.1.2. Value Chain Actors in Private Sector

Milk Processors/Small Dairies: Small milk processing facilities managed by individuals or cooperatives are the major actors in dairy sector at local level. They collect milk, process it and sell milk products in local markets. Banke district has 25 such small dairies with combined capacity of processing 8,950 litres of milk daily while Bardiya district has 17 such small dairies with total capacity of collecting and processing 6,750 litres milk per day.

Sweet shops: Sweet shops in local town and bazars are other major actors (consumers) of the dairy sector. There are a number of large sweet shops in Nepalgunj city but these sweet shops prefer to buy milk from vendors who come from across the border. These shops buy milk from vendors and usually don't buy milk from dairy cooperatives. Some of the stated reasons for buying milk from vendors from India include, assured supply, and competitive price of milk.

Milk Cooperatives: Milk cooperatives are registered with Cooperative Divisional Office of the government of Nepal. These cooperatives manage milk collection at local level, and they are free to process and/or sell milk and milk products either in open market or they enter in an agreement with Milk Supply Scheme and sell milk to DDC. A total of 33 (14 in Banke and 19 in Bardiya) such milk cooperatives are functional in the study area.

Agro-vets: Agro-vets serve as input suppliers and service providers for dairy sector. These agro-vets supply feed, medicine and other equipment needed for dairy industry. In addition, the agro-vet owners who are mostly mid-level technicians are the first contact point for the farmers for service and advice. There are 133 (97 in Bardiya and 36 in Banke) such agro-vets in the study area.

Feed companies: Feed industries and feed depots are other major stakeholders of dairy sector. There are three feed industries in Banke while there are many feed depots in Banke and Bardiya.

Supporting Agencies: In addition to the government agencies there are many non-government organizations playing very important role in dairy sector. Farmers' cooperatives, NGOs and I/NGOs are also playing important role in facilitating smallholder farmers in production and marketing of milk.

4.2. Value Chain Functions

4.2.1. Farming Practices

Dairy farming in this region of the country typically operates at subsistence level. This is truer with cattle and buffalo keeping in our study area – Barabardiya Municipality, which basically comprise a number of villages in a process of transformation into urban settlements, with only a few small markets.

Of the total 15,070 households of the municipality, 86% (13,022) depend on agriculture and about 62% (9,345) keep livestock. As per municipality records, there are 10,295 cattle and 9,278 buffaloes in the municipality. But these animals are low producers, with only a very small number of improved breed of dairy animals (1.62% cattle and 4.58% buffalo) in the municipality.

4.2.2. Inputs and Services

Though limited, farmers in the municipality have access to advisory services and inputs. The records show 33 agro-vets in operations in the municipality. Similarly there are five Artificial Insemination (AI) centres including four managed by private

para-vets where farmers can access breeding service, if and when they need.

4.3. Actors Involved in Milk Production

Despite 62% households in the municipality raising livestock, the milk production in the municipality is comparatively low. This is reflected in milk produced in the municipality. The municipality produces 894 MT of milk annually, of which about 500 MT is sold to outside markets through four cooperatives in operation currently.

4.3.1. Dairy Cooperatives

The four cooperatives engaged in milk collection and processing business have been presented in Table 2. These cooperatives collect milk from members and other farmers and sell the collected milk mostly to NMSS, Kohalpur. However, the volume of their transaction is small.

4.3.2. Shubha Laabha Pashu Bikash Cooperative, Jayanagar

The Shubha Laabha Pashu Bikash Cooperative, established eight years ago, was initiated way back in 1988 (BS 2045) as a buffalo farmers' group. The cooperative started collecting and selling milk to NMSS in 2010 but it had to stop the business as there were some governance and other organizational issues. Moreover, the operation then was not of economical scale to make business sense.

The cooperative has been reorganized in July 2018 and it has resumed business of milk collection and processing. With the help from local municipality and DCA Nepal through the TWUC, the cooperative has purchased some dairy equipment (1,000 litre chilling vat, generator etc.) and has been collecting about 700 litres of milk daily from about 400 farmers through five different collection centres. The Shubha Laabha cooperative is using computerized milk analyzer to test milk and calculate price of the milk. This system has made farmers, who were skeptical towards the

Table 2. Major cooperatives in milk collection and processing in Bardiya district, 2018

SN	Name	Address	Members		
			Female	Male	Total
1	Jana Kalyaan Milk Producers' Cooperative	Barabardiya-9	23	113	136
2	Pipal Milk Producers' Cooperative	Barabardiya-3	20	33	53
3	Padanaha Milk Producers' Cooperative	Barabardiya-4&5	55	234	289
4	Shubha Laabha Pashu Bikash Cooperative	Barabardiya-6	11	93	125

cooperative once, trust the cooperative system. Consequently, the cooperative has been successful in processing milk and selling milk products like ghee, paneer and curd in local market. Currently about 160 litres of milk is locally sold in the form of milk or milk products while remaining milk is supplied to NMSS, Kohalpur and Kedareshwor Dairy, Kohalpur. The cooperative also has contractual agreement with DDC to supply minimum 250 litres of milk per day while DDC has agreed to buy maximum of 500 litres of milk daily.

4.4. Current Status of Milk Marketing

More than 1,600 dairy cooperatives are in successful operation in Nepal (NEPC, 2074/75). They collect milk from farmers, few of them process milk and cater local demand of dairy products while majority sell surplus milk to small and large dairies in private or government sector. These cooperatives are independent to collect and sell milk.

The milk cooperatives generally try to sell milk to private dairies as they pay higher price than government owned DDC. This often leads to other problems like delayed payments and buyers not buying all the milk collected by cooperatives round the year. This is because there is a strong seasonal influence in milk production and market demand of milk in Nepal. Milk production in terai increases during winter (October-March) and this period is termed as flush season while milk production decreases during summer (April-September) a period termed as lean season. The private dairies, due to their small scale of operation pay higher price and buy milk during lean season but do not buy extra milk during flush season.

Given the precarious nature of markets for milk and milk products, it may be fair and safe strategy to partner with the DDC for following reasons:

- DDC is the largest milk processor in the country and it has its own national milk grid and national market. Thus, the DDC even during flush season buys milk from cooperatives and sends to markets in other parts of the country in the form of either fluid milk or in the form of processed high value products (Cheese, Paneer etc.).
- DDC being a public sector undertaking profit alone is not its motive and it gives consideration to farmers' interests too, which seldom is the case with private dairies.

4.5. Pricing of Milk and Payment System

4.5.1. Pricing System of Milk

The milk price in Nepal generally revolves around the price fixed by the DDC. Consequently, quite often the prices offered by private sector tend to be slightly higher than the one set by the DDC. The current price of milk is the addition of three components: NPR 5.35 per unit fat, NPR 2.43 per unit SNF and NPR 0.35 for per unit of total solid. Farmers receive the price of

fat and SNF while price of total solid is the commission for cooperatives. In addition to the commission, the cooperatives receive negotiated transportation cost of milk from the DDC.

4.5.2. Payment System

The cooperatives test sample of the milk a farmer brings daily and issue a slip to the farmer with quantity of milk supplied and price s/he will get immediately if computerized milk analyzer is in use. If not, the milk sample is tested manually and price of the milk supplied is recorded in the pass book of individual farmer. Generally, farmers/producers are paid every fortnight if the buyer is DDC because the DDC pays to the milk cooperatives two times a month. The price of the milk a cooperative supplies to DDC chilling centre is deposited in to the account of the cooperative. However, payment is often irregular and late if the buyer is a private dairy.

4.6. SWOT Analysis of Shubha Laabha Pashu Bikash Cooperative

Since the focus of the study has been to facilitate the development of business case for Shubha Laabha Pashu Bikash Cooperative, we conducted a SWOT analysis to build a comprehensive picture of the organization and the broader operating environment including market potentials (Table 3).

Our analysis indicates that supporting/facilitating services (power supply, road network, veterinary and input supplies, banking etc.) exist to consolidate and expand the milk production and processing business, including diversification of processed milk products (paneer, ice cream, sweets). Moreover, municipality is very supportive to the cooperative and opportunities exist to utilize government schemes (subsidies and insurance) and seek investment from other agencies for financial support and technical backstopping. In fact, municipality and other agencies have co-financed in establishing chilling centre, with the possibility of further investment in future. Last but not the least, the cooperative has contractual agreement with DDC to supply milk, which will be crucial when expanding the business and higher volume of milk will be collected.

On the other hand, several weaknesses have emerged from the exercise, which must be overcome to realize the potentials/opportunities. For instance, the production is still subsistence-oriented so achieving a minimum threshold to operate profitable enterprise may take a while. We sensed that internal governance of the cooperative will have to be improved paving way for broad membership base, earn trust of the dairy farmers and promote the spirit of cooperative movement. The cooperative members seem highly enthusiastic to expand their business, which is however not well supported by the milk production data from the area, available infrastructure and the funds for investment. Also, we must not underestimate the competition posed by smaller vendors from cross-border milk traders, and appreciate the limitations of DDC to buy milk produced by cooperative farmers, especially during flush season.

Table 3. A SWOT Analysis of Shubha Laabha Pashu Bikash Cooperative, 2018

Strengths	Opportunities
» Dairy cooperatives are operational in milk collection and selling business » Local municipality is supportive of cooperative » Veterinary and extension service from public and private sector is available » Municipality has power (electricity) required to preserve and process milk » The municipality is linked to highway and markets (Nepalgunj and Kohalpur) by all-weather road » Business link with DDC already established; the cooperative is processing and marketing milk	» Potential exists to strengthen and expand cooperative operations - diversification » Possibility to collect milk from more farmers and new areas » Opportunity to sell collected milk to DDC » Utilize government services and schemes (subsidies, insurance etc.) and increase milk production » Opportunity to get technical and financial support from external agencies
Weaknesses	**Threats**
» Milk production and productivity in the municipality is very low – economic viability? » Livestock farming is at subsistence level, and changing farming practices of Tharu farmers from traditional to commercial ones is very difficult » Weak internal governance of cooperative; gaining farmers' trust and support to the cooperative	» DDC may not be able to buy all the milk collected by the cooperative » Competition from cross-border flow of milk » There are very few small markets in the municipality and local demand for milk and milk products also is rather limited

Given the fact that Shubha Laabha Pashu Bikash Cooperative has restarted the business after a long hiatus, and the cooperative at present do not have required funds for investment necessary for expansion of their business, we propose expansion as well as diversification of their business be gradual building on their experiences and learning. The project could support capacity building activities, especially governance of cooperative and broadening membership base, and training of cooperative members and staff on diversification of dairy products.

5. CONCLUSION

A three-member LI-BIRD team accomplished dairy value chain study in Barabardiya Municipality, Bardiya. The main objective of the study was to assess viability of Shubha Laabha Pashu Bikash Cooperative's milk collection and processing business.

The study team spent considerable time in the field (2 – 5 November 2018) meeting and interacting with different stakeholders. The team analyzed available secondary data and visited and interacted with major actors

of dairy value chain in Banke and Bardiya districts.

Following are the conclusions of the study:

» Dairy farming in Barabardiya municipality is at subsistence level. Despite subsistence-oriented production, there is possibility of developing dairy farming and increasing milk production and productivity in the municipality;

» Shubha Laabha Pashu Bikash Cooperative has the potential to collect about 1,000 litres of milk daily during flush/winter season while milk collection during summer will be around 500 litres. The operation will be viable to the cooperative if 1,000 litres of milk is collected and sold daily;

» Currently the cooperative is processing about 300 litres of milk and selling dairy products (curd, ghee) locally. We estimate that processing capacity can be increased to 500 litres of milk daily by diversifying milk products (curd, ghee, ice cream, paneer etc.) and selling them in local market. Remaining collected milk will have to be sold to NMSS and private dairy. Since the current contract with NMSS is for buying of up to 500 litres maximum, increase in milk collection beyond 1,000 litres per day may result in market glut;

» The cooperative members and staff need capacity building training and mentoring to improve their governance, create broad-base membership, develop trust amongst farmers, strengthen technical capacity for diversification of milk products and legal compliance; promote rural-urban value chain; conduct awareness programme targeting to school students; and

» As of now, it's not obvious how marginal and indigenous Tharu women and youths are benefitting from project support to the cooperative. Hence, concerted efforts on the part of TWUC and DCA Nepal to bring them onboard is warranted to justify the project investment.

6. POSSIBLE SHORT-TERM AND MEDIUM-TERM INTERVENTIONS

Based on the above findings and analyses, the study team have proposed some key short-term interventions to be accomplished within two years followed by some medium-term interventions to be undertaken between 2 – 5 years (Table 4).

Table 4. Proposed short-term and medium-term interventions, 2018

Short-term (Up to 2 Years)	Medium-term (2 – 5 Years)
Institutional Development Strengthen the cooperative, reform Executive Committee if needed and review its laws and bylaws, diversify membership base, and increase cooperative's financial capital. **Milk Production** » Train farmers on livestock management; and hygienic milk production » Refresher training to service providers like para-vets and Village Animal Health Workers (VAHWs) **Milk Collection, Processing and Marketing** » Negotiate with DDC and private dairies in Kohalpur and Nepalgunj regarding quantity and price of the milk » Identify possible locations to establish milk Collection Centres; orient dairy farmers about Collection Centres » Select milk collector, equip the collection centres and train collectors » Rent or construct facility to establish milk processing; install necessary equipment; train at least two cooperative staff on milk handling and processing » Get license from Department of Food Technology and Quality Control (DFTQC); identify dealers for milk/milk products in municipality; limit milk collection to 1,000 lit/day, and process and sell as much as possible locally **Product Diversification** Small dairies tend to incur loss if they sell fluid milk alone. Standard milk (3% fat) is less preferred by consumers, so diversification of dairy products having high margin and good demand are worth exploring: » Curd (plain/sweetened) – 200ml cups, 500 ml packets » Paneer – per season and demand (growing demand) » Ice Creams – low priced ice candy during summer » Flavoured milk » Skimmed milk to rural tea shops	**Milk Collection, Processing and Marketing** » Target to collect and handle 2,000 litres of milk per day » Target to process 500 litres of milk daily and sell milk and milk products locally **Milk Production** » Support breed improvement programme; Support Artificial Insemination (AI) programme » Continue supporting service providers » Initiate feed depot » Promote seasonal fodder production » Liaison with municipality and other agencies and implement milk production activities **Processing, Product Diversification, and Market Expansion** » Based on market demand, increase volume of dairy products with higher market demand; continue product diversification process » Explore nearby markets for dairy products » Focus on quality delivery to establish 'Brand Value' in the market

In short-term interventions, strengthening the cooperative governance need to receive high priority because that would be the foundation for building trust amongst members and milk producer farmers leading to sound growth of the enterprise in medium to longer terms. This effort has to be supplemented by some investment plans in collection centres, processing units and skills enhancement of cooperative staff for diversification of dairy products as proposed in Table 4. It's absolutely critical to acquire operating license from Department of Food Technology and Quality Control (DFTQC) while selling milk and milk products in the market.

The medium-term interventions include raising the milk collection and chilling capacity to 2,000 litres, which has to be based on the market response. In order for milk producers to benefit, productivity of animals need to be increased, so interventions related to breed improvement, fodder and forage grass, veterinary services and insurance coverage will have to be expanded in close collaboration with municipality and other development agencies. Market expansion beyond local markets will have to be sought, and diversification of milk products as per market demand will have to be attuned. Finally, ensuring quality products at all times would be the key to longer term business success, and this message must be ingrained amongst cooperative members including milk producers, collectors and processors.

7. INVESTMENT PLAN

Finally, the study team have prepared an estimated investment plan to accomplish the proposed interventions as presented in Table 5 below. This is the investment required to collect and process maximum 2,000 litres of milk daily. The detail of the estimated investment plan has been presented in Annex 2.

Closer analysis of the investment plan suggests that for equipment purchase and infrastructure development, Shubha Laabha Pashu Bikash Cooperative will have to seek external support in addition to their own investment. Whereas project can fully support capacity development actions and partially support in purchase of processing equipment. The cooperative should be able to generate resources for staff payment and operating money to purchase milk on regular basis from its operations. Hence, the proposed investment plan is achievable for the cooperative.

Table 5. Tentative investment plan as per the Cooperative's business plan, 2018

SN	Interventions	Estimated budget (NPR)	Percentage
1	Infrastructure development	1,200,000	15.5%
2	Processing equipment	2,110,000	27.2%
3	Support services and capacity development	1,465,000	18.9%
4	Seed money (procurement of milk)	1,950,000	25.2%
5	Annual operational cost (staff cost)	1,020,000	13.2%
Total		**7,745,000**	**100%**

The cost-benefit analysis including return on investment per litre of milk and undertaking dairy business for 1,000 litres milk per day have been presented in Annexes 3 and 4. The analysis indicates that directly selling the milk to DDC or private dairy would generate loss to the cooperative (NPR 3.71/litre). This explains why cooperatives are paying farmers lesser price than what they receive from the DDC. However, the situation changes when cooperatives engage in diversifying milk to different milk products such as standard milk (NPR 8.26), curd (NPR 37.26), ghee (NPR 21.3), paneer (NPR 38.06) and ice cream (NPR 275.6). Therefore, diversification of milk products will be vital to make Shubha Laabha Pashu Bikash Cooperative profitable and serve larger number of smallholder dairy farmers.

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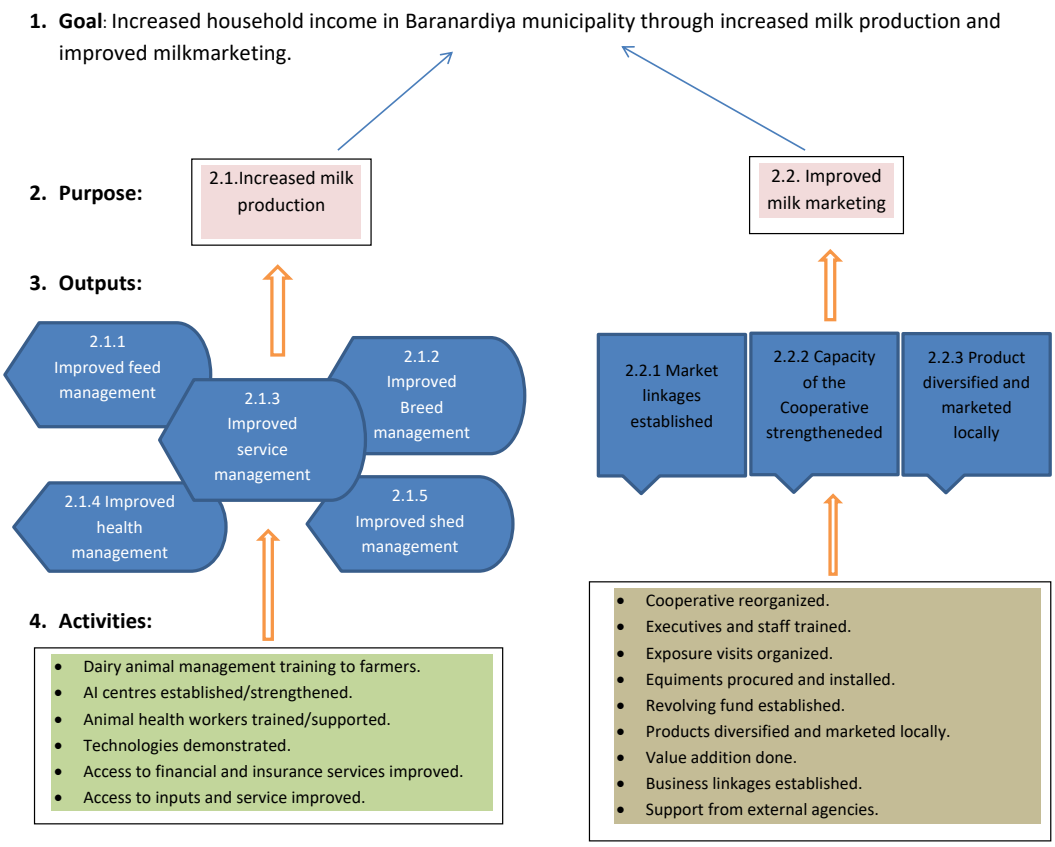
9. ANNEXES

Annex 1. Theory of Change for the Dairy Value Chain in Barabardiya Municipality, 2018



Annex 2. Estimated Investment Plan for Shubha Laabha Pashu Bikash Cooperative, 2018

Investment Plan					
	Major headings	**Unit**	**Unit Cost**	**Target**	**Budget (NPR)**
I. Purchase of Equipment					
1	Batch pasteurizer (200 lit) set	number	110000	1	110,000
2	Automatic Cream Separator	number	80000	1	80,000
3	Chilling vat (1000 lit)	number	500000	1	500,000
4	Milk can (40 lit)	number	8000	40	320,000
5	Deep Fridge (500 lit)	number	50000	2	100,000
6	Refrigerated show case	number	125000	1	125,000
7	Packaging machine	number	150000	1	150,000
8	Milk testing unit	number	300000	1	300,000
9	Milk storage tank (1000 lit)	number	100000	1	100,000
10	Ice cream machine	number	225000	1	225,000
11	Other equipment/accessories	lump sum	100000		100,000
Sub-total					**2,110,000**
II. Construction of factory					
12	Milk processing facility	square feet	1200	1000	1,200,000
Sub-total					**1,200,000**
III. Support to Milk Production					
13	Hygienic milk production training for farmers (2 day)	event	25000	15	375,000
14	Livestock Management Training for farmers (3 days)	event	30000	15	450,000
15	Training/refresher AI training to para-vets	persons	30000	5	150,000
16	Refresher Training to VAHWs (15 days)	persons	25000	1	25,000
17	Support to AI Centers & promotion of AI	centers	60000	5	300,000
Sub-total					**1,300,000**
IV. Milk Collection and Processing					
18	Training executives of cooperatives	Event	25000	1	25,000
19	Training milk collectors	Event	30000	1	30,000
20	Training Milk Processor	Person	30000	2	60,000
21	Observation tour of executives of the cooperatives (Banke and Bardiya)	Event	50000	1	50,000
Sub-total					**165,000**

V. Staff Cost					
24	Manager	person	300000	1	300,000
25	Production technician	person	250000	1	250,000
26	Factory workers	persons	200000	2	400,000
27	Part time workers	man days	700	100	70,000
Sub-total					**1,020,000**
VI. Seed Money					
28	To procure milk from farmers for a month	litres	55	30000	1,650,000
29	Purchase of production materials for milk and milk products				200,000
30	Market promotion and miscellaneous				100,000
Sub-total					**1,950,000**
Grand Total					**7,745,000**

Annex 3. Cost-Benefit Analysis of One Litre of Milk

Costs and Benefits from one litre of Milk							
SN	**Description**	**Milk sold to DDC**	**Standard Milk sold locally**	**Curd**	**Ghee**	**Paneer**	**Ice Cream**
A	**Costs**						
1	Current Price of one lit of milk with 5.5 % fat and 8.5% SNF (NPR)	50	50	50		50	50
2	Electricity cost for chilling / pasteurizing and processing (NPR)	0.5	1	1.5	1.5	1	6
3	Labour (including transportation, management and marketing)	2.83	2.83	2.83		2.83	2.83
4	Cost of other production materials (chemicals, cups, packaging materials, etc.) for products made from one litre of milk		1	2.5	0.2	3.2	265
5	Depreciation cost per litre of milk on cost of equipment, sheds etc. @ 10% per year (NPR)	0.91	0.91	0.91		0.91	0.91
	Cost of sale (value addition)	4.24	5.74	7.74	1.7	7.94	274.74
	Total cost	54.24	55.74	57.74	1.7	57.94	324.74
B	Benefit						
1	Quantity of product from one litre of milk (gm/ml)		1 lit	950 ml	25 gm	160 gm	3 lit
2	Current sale price of 1 kg of the product		64	100	920	600	200
3	Sale value of the product from one litre of milk	50.53	64	95	23	96	600
	Profit	**-3.71**	**8.26**	**37.26**	**21.3**	**38.06**	**275.26**
	Benefit cost ratio	**0.93**	**1.15**	**1.65**	**13.53**	**1.66**	**1.85**
	Return on Investment(ROI)	**-6.8**	**14.8**	**64.5**	**1252.9**	**65.7**	**84.8**

Note: Milk sold will be standard milk with 3% fat, and 2.5% fat out of 5.5% would be separated for preparation of ghee.

Annex 4. Cost-Benefit Analysis of Collecting, Handling and Selling 1000 Litres of Milk Daily

Cost and benefit of collecting, handling and selling 1000 lit of milk daily				
SN	**Description**	**Quantity**	**Unit Cost/ price**	**Total**
A	**Costs of collecting, handling and chilling 1000 lit of milk**			
	Current Price of 1000 lit of milk with 5.5 % fat and 8.5% SNF (NPR)	1000	50	50,000.00
	Average Electricity cost for chilling/ pasteurizing and processing (NPR)	1000	1.5	1,500.00
	Labour (including transportation, management and marketing)	1000	2.83	2,830.00
	Depreciation cost per litre of milk on cost of equipment, sheds etc. @ 20% per year (NPR)	1000	0.91	910.00
	Total			**55,240.00**
B	**Benefits**			
	Selling 500 lit of milk to DDC	500	50.53	25,265.00
	Selling dairy products of 500 lit of milk locally			
	250 lit of standard milk locally	300	64	19,200.00
	Paneer (15 Kg)	90	96	8,640.00
	Ghee 25 kg		920	23,000.00
	Curd (95 kg)	100	100	9,500.00
	Ice Cream	10	200	6,000.00
	Total			**91,605.00**
	Profit			**36,365.00**

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