Chapter 4

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Chapter 4

Analysis of Fresh Milk Value Chain in North Viet Nam

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1. Introduction

Background

Viet Nam has no tradition in breeding dairy cattle. For centuries, cattle were used just for plowing, manure, and meat production. The Vietnamese started to raise dairy cows at the end of the 18th century when colonisers brought the first dairy cows to the country. Since then, it has been an important economic activity of Vietnamese farmers. In October 2001, the Viet Nam government strongly promoted dairy development to replace dairy product imports, generate rural employment, and increase rural incomes.

Viet Nam's fresh milk market is a potential market with a significantly increased demand. From 2010 to 2015, the demand for raw milk rose by 61% (Dairy Vietnam [c]). In 2010, each Vietnamese consumed about 15 litres of milk per year. By 2020, this figure is forecast to almost double, up to 28 litres per year. However, Viet Nam's dairy industry now faces some difficulties in terms of milk quantity and quality. The total milk supply of the whole industry satisfied only 20%–30% (data from 2009) of domestic demand and Viet Nam had to import most of its dairy products (Dairy Vietnam [c]). Moreover, consumers, now aware about health and food safety, are more concerned about their consumed milk products. Thus, milk containing melamine, which makes it unsafe, remains a big problem and negatively affects the industry (Bui, T.N., H.C., Tran, and P. Lebailly, 2011).

Another problem is a loose linkage amongst actors and stakeholders in the milk chain so that the quantity and quality of fresh milk have not been ensured. In 2016, dairy farmers in Cu Chi could not sell their milk because dairy plants refused to buy their output (Pham, 2016). In 2018, thousands of farmers sold their cows and changed into other economic activities (NLDO, 2018). In 2017, farmers in Ha Nam found it difficult to find feeds resources because the flood severely destroyed their grass fields and there were rarely other input suppliers (Phung, 2017).

Therefore, this study and analysis of the fresh milk chain in the north of Viet Nam is necessary.

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Objectives of the Study

This research aims to analyse and evaluate the fresh milk chain in the north of Viet Nam through a case study of Son La and Ha Nam provinces. It then suggests some recommendations to upgrade the chain, improve the benefits for dairy farmers in particular and the fresh milk chain actors as a whole.

2. Methodology

The Selection of the Study Sites

Dairy farming is not a conventional economic activity in Viet Nam because of its unfavourable natural conditions. Viet Nam is famous for its tropical monsoon climate with a high relative humidity (84%–100%). It also encounters severe natural disasters all-year round, such as flood, drought, storm, etc. There are only two highland areas in Viet Nam where natural conditions are suitable for dairy farming: Moc Chau District, Son La Province (in the north) and Da Lat, Lam Dong Province (in the south). They have a relatively cool climate, the dairy farmers are more experienced in dairy farming and are, therefore, more productive. For these reasons, Son La Province was selected for the study.

According to the Government Decision for Dairy Production in Viet Nam No. 167/2001/TTg, dated 26 October 2001, Ha Nam, together with Son La Province, is also encouraged to engage in dairy farming (making it a total of 30 provinces across the country). In contrast with Son La Province, Ha Ham has less favourable conditions for dairy farming. It is a lowland area, has relatively hot climate, and its farmers are less experienced in milk production. Two districts in Ha Nam chosen to be studied are Ly Nhan and neighbouring Duy Tien.

Table 4.1: Natural Conditions of the Study Sites

	Moc Chau District, Son La Province	**Ly Nhan and Duy Tien Districts, Ha Nam Province**
Geographical location	• Located in a mountainous area northwest of Viet Nam, southeast of Son La Province • An important spot to connect Son La and other northwestern provinces with Ha Noi and the Red River Delta	• Located in the Red River Delta of Viet Nam • Easy to connect to other regions and markets
Topographic characteristics	• Many rugged mountains and wide valleys • Moc Chau Plateau is flat and large, the widest area reaches 25 km with the average height above the sea level of 1,050 km	• A delta area so the terrain has plain topography and terrain • A plain of sediment deposited from large rivers with fertile land
Climate conditions	• Sub-temperate climate, cold and dry winter, cool summer with heavy rain • Average temperature: 15°C–20°C • Average rainfall: 1,560 mm • Humidity: 60%–85%	• Tropical monsoon climate, hot and humid • Four seasons: spring, summer, fall, and winter

		• Average annual temperature: 23°C–24°C, in some days, the temperature rises to 38°C–39°C. • Average rainfall: 1,900 mm • Average humidity: 85%
Water supply conditions	• Da River is the largest river and borders Moc Chau District in the northeast and has an important role for Moc Chau. • Water resources are unevenly distributed, due to high mountainous terrain.	• The average rainfall for water resources falling about 1.602 billion m^3 • Surface water supply from the Red River, Day River, Nhue River brings about 14.05 trillion m^3 of water annually • Underground water in Ha Nam exists in many layers and is of good quality, meeting the needs of socio-economic development.

Source: Collected from websites of the People's Committee of Moc Chau District (Son La) and Ly Nhan, Duy Tien District (Ha Nam).

Data Collection

- Secondary data

Secondary data in this research was collected from websites of the People's Committee of the study sites, articles in the Internet, and various studies about dairy production of national and international projects

- Primary data

Structured interviews

This research is both a qualitative and quantitative research. The primary data came from a project supported by the Australian Centre for International Agricultural Research (ACIAR) (ACIAR AH/2016/020), which was collected in 2017 through two-round surveys.

The first round of the project involved semi-structured interviews to collect qualitative data and information in order to define and describe the milk chain in its actual stages: fresh milk production, collection, processing, and distribution. Besides, it would help describe the characteristics of the chain actors, flow of information, flow of products, and supporting system. This step would also help analyse the overall value chain. Generally, it started with the dairymen and finished at the retailers.

The second round of the project involved structured interviews with standard questionnaires. Questionnaires were distributed to 40 dairy farmers in each study site in Son La and Ha Nam provinces. The questionnaires were broken down into nine sections which covered information about (i) the socio-economic status and characteristics of the dairy farmer; (ii)milk production, including herd size, characteristics of cow's milk production, inputs and outputs from cow milk production, expenses, feed resources; and (iii) market and linkages for the milk produced, and socio-economic issues related to improved milk production.

About two-thirds of the questionnaires included close-ended questions, which means responses were classified into predetermined codes. Other questions were open ended, allowing interviewees to respond.

Informal interviews

Two field trips were carried out in Moc Chau Farm Commune, Moc Chau District, Son La Province and Trac Van Commune, Duy Tien District, Ha Nam Province. These field trips aimed to collect qualitative data and cross-check information obtained from other sources by observation and in-depth interviews with dairy farmers.

After researching the real situation of two sites, Ly Nhan and Moc Chau districts, the research group studied all dairy smallholders which had less than 40 dairy cows. However, in Ly Nhan, the number of smallholder farms was not enough; thus, some dairy farms in Duy Tien, a neighbouring district of Ly Nhan, were studied. In total, 80 dairy farmers participated in the research in two provinces.

Data Analysis

The analytical method in this chapter is twofold: The first is a description of the dynamics of long-term policy and economic background surrounding the dairy sector in Viet Nam and selected sites. The second is a structural analysis of activities of firms along the value chain, especially input suppliers, milk collectors, milk producers, dairy plants, and stakeholders.

The value-added analysis applied to the Seng Cu rice value chain of Viet Nam in Chapter 3 focused mainly on value chain mapping and economic or cost–benefit analysis. This chapter, on the other hand, puts more emphasis on the description of the linkages among actors, including sales/purchase contracts and financial, technical, and other support, as well as the functions of each actor inside and surrounding the chain. This chapter also briefly explains the cost–benefit structure of milk producers and the distribution of profit in the value chain.

3. Milk Production in Viet Nam and Study Sites

Milk Production in Viet Nam

Dairy farming is not conventional in Viet Nam. It started in the early years of the 20th century. Here are some significant periods in Viet Nam's dairy sector (Dairy Vietnam [b]):

- 1920–1923: The French brought some cow breeds which could bear the tropical climate, such as Red Sinhi and Ongle, into Tan Son Nhat, Sai Gon, and Ha Noi to produce for French people in Viet Nam. Dairy cows at that time numbered about 300 heads, and the milk yield was only about 2–3 kg/cow/day.
- 1937–1942: In the south of Viet Nam, some dairy farms were established, producing about 360 tons of milk per year. More breeds such as Jersey, Tharpara, Sahiwal, and Haryana were brought into the country besides Red Sindhi and Ongle. With support

from the Australian government, a purebred Jersey Center was established in Ben Cat with 80 heifers; it was later dissolved because of the Viet Nam War. Private farms in Tan Binh, Go Vap, and Thu Duc started to raise dairy cows with a herd size of 10 to 20 heads.

- 1954–1960: In the north of Viet Nam, the government encouraged dairy farming. State-owned farms and dairy cow raising and research centres were established in Ba Vi (Ha Tay), Than Uyen (Nghia Lo), Moc Chau (Son La), Tam Duong (Lao Cai), Huu Nghi (Quang Ninh), Ha Trung (Thanh Hoa), etc. In 1960, Beijing's black-and-white breed was brought into Ba Vi, Sa Pa, and Moc Chau. The Cuban government helped Viet Nam export 1,000 Holstein Friesian to Moc Chau and establish a research centre for male Moncada cows in Ba Vi.
- 1970s: Viet Nam imported dairy buffalo Murrah from India to be raised in Phung Thuong, Song Be, and other regions. As Viet Nam's climatic conditions seemed unfavourable for this breed, not so many Murrah buffalos were raised. Since 1976, Holstein Friesian cows have been distributed to Duc Trong (Lam Dong). Besides, cross-breeding and dairy farming were developing more and more in the southeast and in Ho Chi Minh City. However, in the early 1980s, dairy cows were raised only in some state-owned farms with a herd size of about a hundred heads. The largest state-owned farm was Moc Chau Farm Commune with about 1,000 heads. Because of the farmers' limited experience, inadequate management mechanisms, poor processing conditions and milk consumption, many farms were dissolved due to inefficient dairy farming. The number of dairy cows decreased significantly.
- 1985–1987: Cross-breeding programmes were conducted (Holstein Friesian x Lai Sind (Laisind = Indian Red Sindhi Bulls x Domestic Yellow cow). During this period, Viet Nam imported male and female Sind and Sahiwal breeds from Pakistan to improve the domestic breeds.
- 1986–1999: Since *Doi Moi* (Reform) 1986, Viet Nam transformed from a poor country suffering from food shortage into a country exporting goods. This period witnessed a significant increase in total herd size of 11% per year. Privately owned farms were established.
- 2001: The government strongly encouraged dairy farming and milk production via Decree No. 167/2001/QD/TTg on development policy for dairy farming in 2001–2010.

Through the years, the number of dairy cows in Viet Nam has been increasing. In 2017, the figure reached over 300,000 heads, which was more than 6% compared to 2016. The milk yield has also increased through the years along with the increase in the herd size. Compared to the previous year, milk yield has been increasing 10% on average per year. However, the industry has not met domestic demand and has to import about 70% of inputs, ranked 20th of top countries importing raw milk (Ky Anh, 2014).

Table 4.2: Total Yield of Dairy Cows and Milk

	2015	2016	2017
No. of dairy cows	275,328	282,990	301,649
Increase/decrease compared to previous year (%)	—	2.8	6.6
Milk yield	723,153	795,144	881,261
Increase/decrease compared to previous year (%)	—	10.0	10.1

Note: Data on 1 October in 2015, 2016, and 2017.
Source: General Statistic Office of Vietnam (GSO) (2018).

A typical trait of Viet Nam's dairy sector is that it is dependent mostly on smallholders. Their dairy farms are usually small in herd size, disperse, lacking herd management skills which significantly affect the quantity and quality of raw milk (Dairy Vietnam [c]). For example, in 2012, the total dairy cows across the country were more than 166,000 heads, of which about 120,000 were being raised in smallholder farms and 47,000 cows were being raised in enterprises' dairy farms. Vinamilk is the biggest enterprise in the industry in terms of market share for milk and milk products.[1] The second biggest, FrieslandCampina, has bought 100% of raw milk from smallholders. At this time, TH True Milk ranks third, and can ensure the quantity of input itself with 45,000 dairy cows producing 400 tons of milk per day (Dairy Vietnam [a]).

Moc Chau District, Son La Province

There are three phases in the development of dairy farming in Moc Chau: introduction period (1956–1985), reform period (1986–2000), and development period (2001–present) (Moriyama, 2017).

- Introduction period (1956–1985)

As ordered by the communist party, the armed forces established a collective farm following orders 'from the top'. Many engineers were dispatched from different provinces to Moc Chau to work there. The main purpose of the collective farm was to increase food production in the undeveloped highland areas. The armed forces farm, built in 1958, became a state farm in 1960. In the same year, 24 heads of Beijing black-and-white dairy cows were first introduced for trial and raised in Moc Chau. Ten years later, the Cuban government exported 1,000 pure Holstein-Friesian cows for experiment in Viet Nam. In 1972, 400 heads of Holstein Friesians produced about 400 tons of milk, or roughly 1,200 kg fresh milk per cycle per cow on average. This low level of milk production was attributed to the lower quality of milk cow and feed shortage during winter. During the Viet Nam–American War (1960–1975), the state farm produced canned sweetened condensed milk for the North Vietnamese army. After the reunification of North and South Viet Nam in 1975, the government created the Moc Chau

[1] https://vietnambiz.vn/kho-khan-trong-gianh-thi-phan-dong-luc-tang-truong-2018-cua-vinamilk-se-den-tu-dau-53816.html

state dairy farm and the Moc Chau Milk company. During this period, there was a severe nationwide shortage of food, so the number of milk cows were reduced.

Table 4.3: Dairy Cows in Moc Chau, 1976–1980

Year	Number of Dairy Cows (head)	Average Milk Production (kg/head/day)
1976	134	15.7
1977	387	13.8
1978	684	12.5
1979	701	11.5
1980	761	11.4

Source: Nguyen T. A, Tran C. C, Pham V. N (2009).

- Reform period of dairy farming (1986–2000)

To take advantage of market economisation under the *Doi Moi* (Reform) Policy, dairy farming was converted into a 'bottom-up' process based on the situation of individual farms. Under the Land Law of 1988, individual farmers were provided with cultivated land and milk cows. The dairy cows were fed in a large brick cow house with mortar walls to protect them from the cold. However, feed fell short during winter and about 800 milk cows were slaughtered, thus reducing the number of cattle to 1,300 heads. Milk consumption slowly increased based on the demand from the urban areas. Along with economic and population growth in Viet Nam, the consumption of milk and dairy products increased from 0.47 kg per capita in 1990 to 8.09 kg per capita in 2000 (FAOSTAT, 2011). In 2000, 354 farmers in Moc Chau owned 1,453 milk cows (an average of 4.1 heads per farm).

- Development of dairy farming (2001–present)

In phase III, the 'top-down' government policy and 'bottom-up' requests of dairy farmers were merged. To reduce the import of dairy products, the government introduced in 2001 the Dairy Development Programme. It also aimed at increasing the income of dairy farmers and encouraging them to switch from rice production to dairy production. In 2005, a new dairy farming public corporation was established called Moc Chau Milk. Farmers in Moc Chau were entirely attached to the company by a milk sale contract because it was the only milk purchaser in the region. Under the terms of the contract, farmers must sell the totality of their milk to the company at a fixed price set by the company according to quality standards. Moc Chau Milk Company was directly involved at all levels of the dairy sector: training of technicians and farmers; collecting and analysing the quality of milk; hiring land and farm buildings; manufacturing concentrated feed; providing technical and veterinary services, guarantees, and credits to cattle purchase, etc. In 2018, the Moc Chau company, along with all its contracting dairy farms, was reported to have about 23,000 heads of dairy cows. The average milk production is 25.22 kg/head/day (Moc Chau Milk Company, 2018).

Ha Nam Province

In Ha Nam Province, animal husbandry accounts for 50%, cultivation accounts for 45%, and service accounts for 5% agricultural value. In animal husbandry, Ha Nam farmers raised 750,000 pig heads, 6.5 million poultry heads, and more than 30,000 ruminant heads, mostly yellow, beef cows, and buffalo (Table 4.4).

Ha Nam started its dairy industry in 2001 with 150 dairy cows at the same time as the national dairy project of Viet Nam. However, they faced many difficulties and most dairy farms disappeared. In 2013, Ha Nam authorities committed to improve dairy production again. In 2014, they launched the dairy project (second period) with the support of two dairy-processing companies that committed to consume all dairy milk for farmers. Thus, during this year, 500 dairy cows imported from Australia and bought from Moc Chau were raised in Ha Nam. In 2016, Ha Nam approved a dairy project for 2016–2020 with many supported dairy farmers to promote dairy production.

By 22 February 2017, 196 farmers, raising 2,562 dairy cows in Ha Nam Province, produced an average of 20.6 tons of milk per day. Duy Tien district had 109 farms raising 1,457 dairy cows, which produced 12.8 tons of milk per day. Ly Nhan district had 23 farms raising 605 dairy cows and produced 3 tons of milk per day. Kim Bang district had 57 farms raising 249 dairy cows and produced 2.6 tons milk per day. Thanh Liem district had three farms raising 24 dairy cows. In addition, a company was raising 75 dairy cows, and two nuclear farms of FrieslandCampina was raising 152 dairy cows and producing 2.2 tons of milk per day.

Table 4.4: Milk Production in Ha Nam Province, February 2017

District	Commune	Number of Farms	Numbers of Newly Bought Cows	Number of Newly Born Calves	Number of Lactating Cows	Milk Collection
		Farms	Heads	Heads	Heads	Tons/Day
1. Duy Tien	Total	109	16	21	1,457	12.8
	Moc Bac	78	5	21	950	In Moc Bac commune: 9 In Chuyên Ngoại: 3.8
	Chuyen Ngoai	21	0	0	245	
	Trac Van	13	11	0	203	
	Yen Nam	4	0	0	59	
2. Ly Nhan	Total	24	8	30	605	In Nhan Binh: 3
	Nguyen Ly	8	0	1	149	
	Chinh Ly	4	8	2	101	
	Xuan Khe	2	0	0	42	
	Nhan Dao	2	0	0	35	
	Nhan Binh	5	0	4	112	
	Hoa Hau	1	0	19	129	
	Nhan My	1	0	4	35	
	Vinh Tru	1	0	0	2	

3. Kim Bang	Total	57	4	5	249	In Ba Sao: 2.6
	Ba Sao	33	0	4	148	
	Kha Phong	21	4	1	81	
	Tan Son	2	0	0	16	
	Lien Son	1	0	0	4	
4.Thanh Liem	Total	3	0	0	24	
	Liem Tuc	3	0	0	24	
5. Ha Nam Dairy Milk Joint stock company		1	0	0	75	
6. Friesland-Campina		2	0	3	152	2.2
Total: 17 Communes + 2 companies		**196**	**23**	**59**	**2,562**	**20.6**

Source: HPCR (2017).

In 2015, FrieslandCampina established a sustainable dairy zone in Moc Bac Commune, Duy Tien district (Duc, 2015). FrieslandCampina's dairy farming area is a joint project between the Ha Nam provincial government and the Dutch government within the framework of the Sustainable Food Security and Food Security Programme for 2014–2018. The project aimed to establish and develop a professional and sustainable dairy farm on a family-farm scale, thereby contributing to food security, job creation, and minimisation of import of dairy products.

As the main partner of the project, FrieslandCampina directly managed, operated, and invested to build a professional dairy farm in Ha Nam with two sample farms. The company developed and implemented training programmes from basic to advanced levels for dairy farmers; constructed forage production systems; provided training and introduction of technicians about artificial insemination services, veterinary practice, etc.

Farmers who operate dairy farms in the sustainable zone were provided with land to raise cow and grow forage.

On 19 May 2017, Ha Nam Province approved the proposal of Vietnam Dairy Products Joint Stock Company (Vinamilk) to invest in a dairy farm in Thanh Nguyen Commune, Thanh Liem District (Nguyen, 2017). The farm was given 150 hectares (ha) for raising 4,000 heads and 500 ha for growing forage.

Among 197 households, 85 sold to Vinamilk Dairy Company, 13 sold to Dutch Dairy Company, 8 new households – five households in Moc Bac Commune, three households in Trac Van Commune – had not signed milk contracts because there were no dairy cows. Two households opened milk-processing factories and sold in the chain of clean farm products.

Dairy farmers in Ha Nam gained experience in dairy farming such as caring for, feeding, and milking dairy cows. However, dairy farming in Ha Nam still have the following constraints:

- Livestock development is unplanned, not concentrated into specialised production zones, because of the lack of linkages among actors and stakeholders.

- Herd management is still weak, forage areas are limited so that the animal feeds sources are dependent from outside.
- Ha Nam has not had technical staff specialised in cattle, so the effectiveness of consultancy and technology transfer is limited.
- The majority of raw milk producers are small households with small production scale, resulting in high production cost.
- Environmental pollution in dairy farming is one of the big issues.
- The development of dairy herds is relatively low, householders are not investing in dairy farming and some are facing difficulties in acquiring capital.

Interviewees' Profiles in Survey Farms

Surveys were distributed to 40 dairy farmers in each study site. In Moc Chau – Son La, eight (20%) are farm owners, three (7.5%) are managers, and the majority are both owners and managers. In Ha Nam, there is only one farm manager (2.5%) and the rest – 39 farmers, comprising 97.5% – are both owners and farmers. Thus, clearly, majority of interviewees in this research are both owners and managers in both study sites, who thoroughly understand farms and give the most accurate results to the research.

Out of 40 interviewees, males and females equally comprise 50%. However, in Ha Nam, 39 interviewees are male farmers (97.5%) while only one (2.5%) is female.

The average age of dairy farmers in Moc Chau is about 41 years, while that for Ha Nam is higher, at 44 years.

Table 4.5: Interviewees' Personal Information

n = 40		Moc Chau District, Son La Province		Ly Nhan and Duy Tien Districts, Ha Nam Province	
		No.	%	No.	%
Interviewee's Role	Owner	8	20.0	0	0.0
	Manager	3	7.5	1	2.5
	Both	29	72.5	39	97.5
Sex	Male	20	50.0	39	97.5
	Female	20	50.0	1	2.5
Age	Mean	41.2		44.4	
	Median (Min; Max)	39.5 (22; 68)		45.5 (27; 58)	

Source: Survey results, 2017.

Dairy Farming and Milk Production of Surveyed Farms

The dairy farms in Moc Chau, with their longer farming experience and Moc Chau's favourable climate, have larger scale and productivity than those in Ha Nam. The scale of one dairy farm includes the total number of dairy cows, the total area for raising cows and forage, and the number of workers. Productivity involves the average milk production and the total revenue from milk production during a period.

The average cattle in Moc Chau is 40 heads while that in Ha Nam is only 15 heads (Table 4.6). There are about 22 milking and dry cows in Moc Chau and 8 milking and dry cows in Ha Nam. However, there is no big difference in the average number of workers in one farm from both study sites.

Table 4.6: Production Scale of Surveyed Farms

	Moc Chau District, Son La Province	Ly Nhan and Duy Tien Districts, Ha Nam Province
Total cattle (head)	**n = 40**	**n = 40**
Mean	40	16
Median (Min; Max)	42 (15; 59)	12 (3; 40)
Milking and dry cows (head)	**n = 40**	**n = 40**
Mean	22	8
Median (Min; Max)	22 (13; 30)	7 (2; 20)
Labour (People)		
● **Hired workers**	**n = 37**	**n = 39**
Mean	1	0.8
Median (Min; Max)	1 (0; 2)	0 (0; 5)
● **Family workers**	**n = 39**	**n = 38**
Mean	2	3
Median (Min; Max)	2 (1; 5)	2 (2; 4)

Source: Survey results, 2017.

The average milk productivity of studied farms in Moc Chau is 23 kg/cow/day, which is higher than that in Ha Nam, at 20 kg/cow/day. The average revenue from milk per cow per day of the dairy farms in Moc Chau is also higher, given that the average price for raw milk is D12,100 in Moc Chau and D13,100 in Ha Nam. Therefore, even with lower payment per kilogram of raw milk, dairy farms in Moc Chau are seemingly more productive in terms of revenue than those in Ha Nam.

Table 4.7: Productivity of Surveyed Farms

	Moc Chau District, Son La Province	Ly Nhan and Duy Tien Districts, Ha Nam Province
Average milk production (kg/cow/day)	**n = 40**	**n = 40**
Mean	23	20
Median (Min; Max)	23 (13; 30)	20 (16; 26)
Average price (D1,000/kg of milk)	12.1	13.1
Revenue from milk per cow per day (D1,000)	**n = 38**	**n = 38**
Mean	278.3	262.0

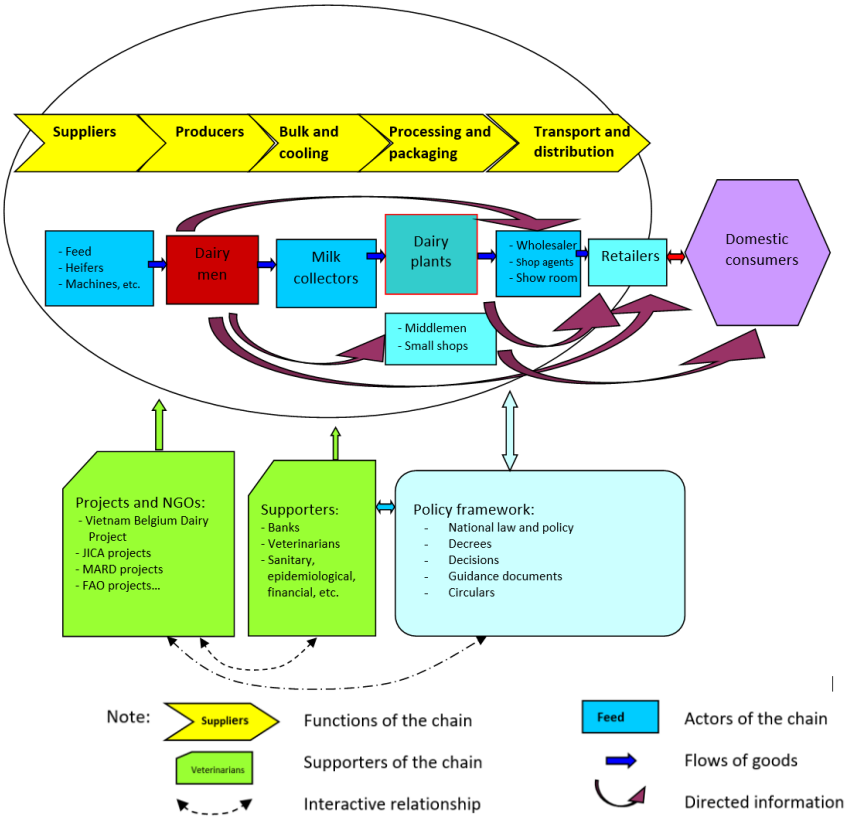
Source: Survey results, 2017.

4. Overview of the Fresh Milk Value Chain

The fresh milk chain in Viet Nam includes milk production, collecting and bulking, processing, and distribution. These functions are performed by major actors: dairy farmers, milk collectors, dairy plants, and milk distributors. Each actor has a specific role in the chain and link together quite well to be a chain. Besides, stakeholders will facilitate the chain's development from outside.

Figure 4.1 presents the main actors and stakeholders in the fresh milk chain in Viet Nam.

Figure 4.1: Basic Actors and Stakeholders in the Milk Chain



FAO = Food and Agriculture Organization, JICA = Japan International Cooperation Agency, MARD = Ministry of Agriculture and Rural Development, NGO = non-governmental organisation.
Source: Bui et al. (2014); survey results, 2017.

The fresh milk chain in Viet Nam starts from the input suppliers who provide breeds, feeds, and machinery for dairy farmers. After production, milk is delivered to milk collectors. Milk collectors do the bulking and cooling processes; after that, milk is transferred to the dairy plants. From there, fresh milk is sterilised, pasteurised, and packaged. Then, it is transferred to distributors, including wholesalers and retailers, and then to the final customers.

In each region, there are normally some major suppliers of heifers, grasses, feed, proteins, etc. for dairy farmers, one of which comes from a dairy plant or is very closely related to one.

Although some local blacksmiths and retailers supply some items of machinery, most of the equipment for milk production is supplied by big companies such as the DeLaval Company.[2]

Besides some big farms from companies or corporations, many farmers keep dairy cows that produce fresh milk. They are the main actors and play the most important role in the milk chain. All other actors almost depend on their operation. Some milk collectors (called collection centres) in each region usually work independently.

The most powerful actor in the milk value chain is the dairy processing company or dairy plant. Theoretically, the dairy processing company depends on the dairy farmers. In reality, it becomes the decision-maker for the chain. It links dairy farmers with input suppliers, milk collectors, and distributors.

In the distribution stage are many participants referred to as small milk shops, milk candy shops, some showrooms and supermarkets, and many agents and retailers.

There are some relevant stakeholders within the chain. Some organisations and projects from the Japan International Cooperation Agency (JICA), Association Sud-ouest pour le Development International Agricole (ASODIA), Ministry of Agriculture and Rural Development, Department of Agriculture and Rural Development (MARD), and National Institute of Animal Husbandry support the dairy farmers.[3] The major fields of support from JICA involve the technique of breeding cows and include a training course for feed preparation. ASODIA provides them with financial support.

The veterinarian and outreach [4] initiatives helped farmers deal with their specialised problems such as controlling diseases, protecting dairy cows from harsh conditions, preventing them from suffering the effects of natural disasters, etc. Financial institutions such as the Bank for Agriculture and Rural Development (AgriBank), along with the Policy and Social Bank, provided them with small loans for keeping cattle.[5] The government and local authorities created the environment to produce milk through decisions, resolutions, directives, decrees, etc.

5. Functions of the Main Actors in the Value Chain

The Input Suppliers

Some difficulties have been reported in the supply of feed for dairy cattle in Viet Nam. In big cities and towns, the price of land is the biggest problem for dairy farmers. But in land-abundant areas, land quality is not suited enough to grow grass that is nutritious for cattle.

[2] This is an international company (http://www.delaval.com/en/About-DeLaval/The-Company/) that collaborates with the dairy plant to provide necessary equipment for dairy farmers.
[3] In fact, only the Japan International Cooperation Agency supported them in technical areas and the Association Sud-ouest pour le Development International Agricole supported in the financial aspect.
[4] Mostly from the dairy plant.
[5] It was difficult for farmers to access these financial institutions. Most of them did not borrow from the banks but saved for themselves.

Another problem is the overuse of herbicides, insecticides, or other chemicals that gradually affects grass growth. Therefore, the quantity of natural and grown grass meets forage demand by only about 30% (Khoi, 2013). Viet Nam's dairy industry now depends too much on the world grass market because about 70% of dairy feed is imported from foreign countries. Due to the shortage of suitable forage, dairy farmers must increase the proportion of processed feed, which lowers milk quality.

Moc Chau Milk, the dairy cattle-breeding company, is the major input supplier for dairy farms in Moc Chau, Son La Province. The percentage of dairy farms supplied with heifers, feeds, fertiliser, and machinery by the milk company is remarkably high. The figure for heifers is 82.5%. In terms of feeds, 100% of surveyed farms have chosen Moc Chau Milk as their supplier of concentrates and by-products. The figures for fertiliser and machinery are 66.7% and 85.7%, respectively. Also, dairy farms can buy machinery for dairy production from local blacksmiths and mechanists.

Table 4.8: Number of Dairy Farms in Moc Chau District, Son La Province, Buying Inputs from Moc Chau Milk

Heifers (n = 40)		Feeds			Fertiliser (n = 36)	Machinery (n = 35)
		Forage (n = 35)	Concentrates (n = 35)	By-products (n = 40)		
No.	33	17	35	40	24	30
%	82.5	48.6	100	100	66.7	85.7

Source: Survey results, 2017.

Meanwhile, in Ha Nam, there are no dominant suppliers. Dairy farmers in Ha Nam usually purchase heifers from Moc Chau. Otherwise, they can buy imported breeds from Australia. Other sources of heifers are Phu Ly, Phu Tho (in the north) and Lam Dong, Cu Chi (in the south).

Most dairy farms in Ha Nam do not purchase feeds from milk companies (Vinamilk or Dutch Lady). They seem to prefer to buy feeds from agents or stores in the local market. Only 12.5% of surveyed farms are supplied forage by their milk company, while the figure for agents is 60% (Table 4.9). For concentrates and by-products, the percentage of dairy farms that are supplied feeds by the milk company is much lower than that by local agents. The percentage of dairy farms buying concentrates from local agents approximately doubles the percentage of farms buying from the milk company. The figure for by-products from agents is seven times higher than that from the milk company. In terms of fertiliser for home-grown grass, the majority of dairy farms (80%) choose to buy from local agents and stores. The same trend happens for machinery.

Table 4.9: Input Suppliers in Ly Nhan and Duy Tien Districts, Ha Nam Province

n = 40		No.	%
Heifers	Various suppliers (Moc Chau, Phu Ly, Phu Tho, Lam Dong, Cu Chi, etc.)		
Feeds			
● Forage	Milk company	5	12.5
	Agents	24	60.0
	Others	11	27.5
● Concentrates	Milk company	13	32.5
	Agents	27	67.5
● By-products	Milk company	4	10.0
	Agents	28	70.0
	Others	8	20.0
Fertiliser	Agents	32	80.0
	Others	8	20.0
Machinery	Milk company	4	10.0
	Agents	17	42.5
	Others	19	47.5

Source: Survey results, 2017.

The majority (97.5%) of dairy farmers from the two study sites find it easy to buy inputs. Despite abundant input supply in Moc Chau, about 74% of dairy farmers said that the input price, in general, is normal; this means that the input supply in Moc Chau is not only stable but also affordable. In Ha Nam, the percentage of dairy farmers who find the input price expensive is higher than the figure for normal. Despite the diversity of input suppliers, the input price in Ha Nam is less affordable than that in Moc Chau.

Table 4.10: Availability and Input Prices

			No.	%
Moc Chau District, Son La Province	**Easy to buy input (n = 40)**		39	97.5
	Price (n = 38)	Normal	28	73.7
		High	10	26.3
Ly Nhan and Duy Tien Districts, Ha Nam Province	**Easy to buy input (n = 40)**		39	97.5
	Price (n = 40)	Normal	13	32.5
		High	25	62.5
		Normal for feed, high for machinery	1	2.5
		High for feed	1	2.5

Source: Survey results, 2017.

Therefore, to ensure quality, stable, and affordable input sources, a contract between farmers and input suppliers would be beneficial. In Moc Chau, out of 40 surveyed farms, 14 farms (35%) have signed a contract with input suppliers. The number of farms receiving support from input suppliers are 11 (27.5%). Some dairy farms received loans, concentrates, or technical support from input suppliers. However, in Ha Nam, no dairy farms have contracts with input suppliers.

Table 4.11: Dairy Farms Signing Contracts With and Receiving Support from Input Suppliers

	Farms Signing Contracts with Input Suppliers		Farms Receiving Support from Input Suppliers	
	No. (n = 40)	%	No. (n = 40)	%
Moc Chau District, Son La Province	14	35.0	11	27.5
Ly Nhan and Duy Tien Districts, Ha Nam Province	0	0	0	0

Source: Survey results, 2017.

Collectors of Fresh Milk

Previously, when the number of dairy cattle was still too small and the consumption of milk buyers was simple, selling–buying was all about self-supply and self-demand. Dairy farmers usually sold their collected fresh milk to nearby refreshments or milk/cake shops for regular consumption needs. Dairy farmers also grouped together and took turns to deliver the milk to milk shops.

Currently, due to the dairy development of each subregion/region, the milk collection network is expanding more and more. Most dairy farms in Viet Nam are far from milk-processing companies; thus, forming a system of milk collection, transshipment, and preservation is essential. Three types of members participate in the milk collection networks across the country: cooperatives (19%), companies (23%), and private collectors (58%) (Chu, 2007). Twice a day (in the morning and in the afternoon), dairy farmers, using their motorbikes, deliver their milk to collection centres. Milk collectors are responsible for collecting and checking the quantity and quality of fresh milk and delivering the milk to the processing plants.

Moc Chau Milk has 16 collection centres so that dairy farmers do not have to travel more than 1 kilometre to sell their milk. After its purchase, (usually at temperatures of 35°C–37°C), it is stored (at 2°C–4°C) and quickly tested to be classified. Then milk collectors take samples of all milk bottles to be checked. The criteria are temperature, dry matter content, fat proportion, microbiological ratio, etc. All milk purchased from the farmers is transported to the dairy plant by specialised vehicles (Thao, 2018).

In Ha Nam, two companies, Vinamilk and FrieslandCampina, buy milk from dairy farms. Vinamilk has three collection centres in Moc Bac and Chuyen Ngoai Commune (Duy Tien District) and Ba Sao Town (Kim Bang District). FrieslandCampina Ha Nam only has two collection centres in Moc Bac (Duy Tien) and Nhan Binh Commune (Ly Nhan district).

Milk collectors in both study sites work independently and receive their income. However, the milk collectors in Moc Chau unofficially work under the control of the dairy plant, Moc Chau Milk Company, while milk collectors in Ha Nam do not work under the power of dairy plants or other actors in the chain.

Table 4.12: Number of Dairy Farms Signing Contracts with Milk Collectors

	Signing Contracts with Milk Collectors	
	No.	%
Moc Chau District, Son La Province	17	42.5
Ly Nhan and Duy Tien districts, Ha Nam Province	3	7.5

Source: Survey results, 2017.

In the case of Moc Chau, it is less risky when milk collectors belong to the dairy plant because they are the representatives of the dairy plants. The dairy plants have already promised to consume the output of dairy farmers so the milk collectors will surely buy the raw milk. Dairy farmers may not have to sign contracts with milk collectors as they already have the contracts with the dairy plant. But in Ha Nam, milk collectors may not buy milk from dairy farmers because they are not controlled by the dairy plant. Therefore, a contract between dairy farmers and milk collectors is necessary.

The number of dairy farms signing contracts with milk collectors in Moc Chau is higher than that in Ha Nam. In Moc Chau, the number is 17 out of 40 farms (42.5%) while that for Ha Nam is only 3 out of 40 farms (7.5%).

Producers of Fresh Milk

- Types of milk producers

In Viet Nam, there are two types of milk producers. The first is the dairy farmer. Majority (about 95%) of fresh milk is produced by small and medium households (Khoi, 2013). According to Khoi (2013), the dairy farmers can be divided into three main groups:

The independent farmers: who buy and raise cows without any support from milk processors. They also do not work under the control of the dairy plant.

The contract farmers: who are the most popular type and appear to be mostly in Ho Chi Minh city. Farmers sign contracts with milk processors. Following the contracts, they receive cow breeds, feeds, medical treatment, and other support from the milk processors. They raise cows in their own land and sell milk to the same milk processors. This type is the symbol of cooperation between farmers and processors.

The dairy farmers working in large agriculture farms: They are in Moc Chau and Ba Vi Dairy farms. They do not possess their own land, so they have to hire land from these farms. Like contract farmers, they also receive cows, feeds, and medical treatment from the farm and sell milk to milk processing companies.

The second type of milk producer is a corporate or company, such as Vinamilk or TH True Milk. It raises thousands of cows in a huge farm using modern technology. Feeding, medical care, and milking are specially supervised to ensure the quality and quantity of the milk.

- Dairy farmers' experience and educational level

In the surveyed farms, Moc Chau farmers have an average experience of 14 years and Ha Nam farmers, 5 years. Moc Chau also has more than 60 years of dairy farming, longer than that of Ha Nam.

In terms of educational level, most of the interviewees in both study sites graduated from high school. The number of dairy farmers chasing higher education is particularly small.

Table 4.13: Interviewees' Educational Level and Dairy Farming Experience

		Moc Chau District, Son La Province		Ly Nhan and Duy Tien Districts, Ha Nam Province	
		No.	%	No.	%
Highest educational level	Elementary	1	2.5	5	12.5
	High School	36	90.0	34	85.0
	College	2	5.0	1	2.5
	Others	1	2.5	0	0
Experience with dairy cattle (years)	Mean	14.4		4.7	
	Median (Min; Max)	13 (1;37)		3 (1;14)	

Source: Survey results, 2017.

- Land resource of dairy farms

Adequate land resource is crucial in dairy farming because it ensures the physical health of dairy cows, such as preventing them from heat or diseases and bacteria. With a large area of land, the dairy farmers can also grow corn and grass on their own so that they will be less dependent on other sources. Also, one benefit of linkages is reduced production costs through economies of scale. The larger the land area is, the larger the production scale of dairy farmers can expand; eventually, the production costs decrease.

With bigger dairy herds, agricultural land used for dairy production in Moc Chau is also larger than that in Ha Nam. The average agricultural land in Moc Chau is about 12,000 m^2 while that in Ha Nam is about 10,000 m^2. Dairy farms in both study sites grow their own forage. The forage area in Moc Chau and Ha Nam is about 8,000 m^2 and 7,000 m^2, respectively. About 1,900 m^2 is being used to raise heifers on average in one farm in Moc Chau and about 250 m^2 in Ha Nam.

Table 4.14: Agricultural Land of Surveyed Farms (m^2)

	Moc Chau District, Son La Province	Ly Nhan and Duy Tien Districts, Ha Nam Province
● **Total area**	**n = 35**	**n = 22**
Mean	11,967	10,150
Median (Min; Max)	10,000 (2,500; 28,800)	9,000 (1,100; 39,600)
● **Forage area**	**n = 40**	**n = 40**
Mean	8,150	7,155
Median (Min; Max)	6,000 (2,000; 22,000)	5,580 (3,600; 36,000)
● **Heifers' stall**	**n = 39**	**n = 40**
Mean	1,944	251
Median (Min; Max)	1,500 (300; 14,820)	200 (50; 1,000)

Source: Survey results, 2017.

Dairy Plants

Dairy plants, so-called milk processors, are in charge of processing, packaging, and transferring raw milk into final products. They are also the actor setting the quality standard of the milk, thus, the ruler of the chain. Viet Nam's market is manipulated by four giants: Vinamilk; FrieslandCampina, known as Dutch Lady brand in Viet Nam (Khoi, 2013); TH True Milk; and Moc Chau Milk.

In the study sites, the milk companies are the most powerful actors in the chain, and they operate the whole chain (Tran and Bui, 2011). Even the purchase price of milk is subject to policy decisions applied to producers (reward, penalty, information requirements, quality requirements). Farmers cannot impose or negotiate prices; they are price acceptors. So, the rights of dairy farmers in this chain have not been demonstrated and their voices have little value. For milk collection, the dairy plant also decides on location, policy, rights, benefits, and responsibilities of each side.

Most dairy farms are smallholders with limited sources of labour, capital, and technology, sometimes even education. This may lead to inappropriate cattle breeding, disease, low adoption of technology, limited market access, etc. Meanwhile, dairy plants can give them those kinds of support.

About 98%–100% of dairy farms sell milk to the milk companies; therefore, all of them have signed the contracts with the dairy plants. There are three types of contracts between dairy farmers and milk processors. In the first contract, the milk processor promises to only provide inputs to dairy farms. In the second, the milk processor purchases raw milk from dairy farms. The third contract is on supplying inputs and consuming outputs. The third type is obviously the most advantageous for both sides; it is a win-win situation. Dairy farmers do not have to worry about input sources and output markets; dairy plants can ensure the quality and quantity of raw milk. In Moc Chau, 100% of them signed contracts with Moc Chau Milk because these contracts not only supply inputs but also purchase output for farmers. Contracts last for 1 year and can be extended in the next year. The proportion of dairy farms receiving support from Moc Chau Milk is also remarkably high, with 70% receiving loans from

the milk company. The amount of loan ranges from D40 million to D200 million with an interest rate of 1.0%–1.1%, in 7 to 24 months. Technique and training support includes dairy cattle raising such as insemination, caring, disease management, etc. This kind of support is usually held in workshops or conferences lasting from 1 to 7 days.

Table 4.15: Linkages between Dairy Farmers and Dairy Plants

	Signing Contracts		Receiving Loan Support		Receiving Technical Support		Trained by Dairy Plants	
	No.	%	No.	%	No.	%	No.	%
Moc Chau District, Son La Province	40	100	28	70	32	80.0	27	67.5
Ly Nhan and Duy Tien districts, Ha Nam Province	40	100	2	5	17	42.5	30	75.0

Source: Survey results, 2017.

In Ha Nam, all surveyed farms have contracts with dairy plants – 18 farms with Vinamilk and 22 farms with Dutch Lady (FrieslandCampina) – to prevent switching of dairy farmers to the two milk companies. Whenever the price of raw milk for one company is higher than the other, dairy farmers can sell milk for the higher price. However, only two dairy farms are provided inputs (one by Dutch Lady and one by Vinamilk). Dutch Lady promised to buy the output of 17 farms. The figure for Vinamilk is seven dairy farms. Three farms have contracts on both supplying inputs and consuming outputs by Dutch Lady and 10 farms by Vinamilk. There is a big difference in the terms of the contracts between the two milk companies in Ha Nam. Dutch Lady mainly offers principal 5-year contracts which will be renewed after 6 months. This kind of contract guarantees that dairy farmers do not easily sell milk to the other company. By contrast, Vinamilk prefers to have contracts with farmers for only a year. To a certain extent, this kind of contract can be risky for the company in securing the stability of input.

The milk companies in Ha Nam hardly provide loan support to dairy farmers. However, they back up dairy farmers in technique and training through workshops or conferences five to seven times a year.

Table 4.16: Number of Dairy Farms Contracting with Milk Companies

		Types of Contracts			Terms of Contracts (years)				
		Supplying Inputs	Purchasing Output	Both	0.5	1	1.5	3	5*
Moc Chau District, Son La Province		0	40	0	40	0	0	0	0
Ly Nhan and Duy Tien districts, Ha Nam Province	Dutch Lady	1	17	3	1	4	0	0	16
	Vinamilk	1	7	10	0	13	0	0	0

*Dutch Lady will sign a principal 5-year contract with farmers. Every 6 months, it will consider continuing the contract or not. If they find that the farmers follow their regulations, they will renew the contract with them.
Source: Survey results, 2017.

In Moc Chau, the only milk company in the region is Moc Chau Milk Company. It involves in the whole process from input supplying, milk collecting, purchasing and even veterinary extension service via 'Milk sale contract'. They also support farmers in the capital and technical training. The link between farmers and Moc Chau Milk is very close. Besides, Moc Chau Milk promises to maintain the linkages among dairy farmers, milk company and the local authority.

Table 4.17: Relationship among Farmers, Moc Chau Milk, and Local Authorities

Relationship	Responsibilities
Farmers to Moc Chau Milk	● Ensure the quality and quantity of milk and raw materials for animal feeds. ● Guarantee long-term attachment to milk production and the company, contributing experienced and dedicated human resources for the whole chain. ● Actively participate in cultural activities, bringing the Moc Chau Milk programmes to raise the level of cultural activities. ● Actively participate in the insurance fund, helping households in difficulty. ● Fully trust the support policies of Moc Chau Milk.
Moc Chau Milk to Farmers	● Provide more jobs for local people. ● Purchase raw milk at a competitively high price; provide veterinarians, animal husbandry experts, herds' stalls, etc. ● Organise and contribute to cultural and artistic festivals, ensuring the spiritual life of the people, for example, Dairy Cow Queen Contest, Moc Chau Tea Festival, etc. ● Formulate policies to support people to borrow loans and insurance so that people can feel secure in breeding and production.
Moc Chau Milk to Local Authorities	● Significantly contribute to social security by reducing unemployment. ● Being a leading company, contribute to the economy of the whole province. ● Hold cultural and artistic events to attract tourists to visit Moc Chau. ● Assist local authority in providing loans and insurance to locals.
Local Authorities	● Fully support the company in terms of policies to create a good business

to Moc Chau Milk	environment. ● Son La Provincial Government is formulating policies to help Moc Chau become a community tourism destination, calling on the government to invest in roads and infrastructure. ● Distribute information about Moc Chau Milk on social media.

Source: mocchaumilk.com.

In Ha Nam, dairy farmers are more independent from the milk companies Vinamilk and Dutch Lady. The dairy plants are not involved in supplying inputs, and their support for dairy farmers is limited. So, the link between the farmers and the dairy plants are 'looser' than that in Moc Chau. Farmers need to work with more actors and stakeholders.

Wholesalers and Retailers

Final dairy products are delivered to final consumers through distributors, namely, wholesalers and retailers. Viet Nam imports around one-fourth of total milk consumption; it is considered an importing country of dairy products. Thus, we can assume that the chain ends with domestic customers.

Otherwise, a limited quantity of fresh milk is distributed from dairymen to some local milk or cake shops or directly to wholesalers.

6. Functions of Relevant Stakeholders

Even though stakeholders are not included in the chain, they are in charge of creating a good environment for the chain. Governments can interact with the chain by providing priority loans/funds for the dairy industry, free tax for dairy products, support on price or subsidies to the dairy farms. Of the surveyed farms, 17.5% stated that they are prioritised in receiving loans/funds for dairy cattle production. In Moc Chau, the figure is only 5% because dairy farming and milk production are more developed than those in Ha Nam; dairy farmers in Moc Chau already receive more support from the Moc Chau Milk Company. But for other kinds of support, the percentage of dairy farms that could receive such support is extremely limited.

Table 4.18: Farms Having Linkages with Relevant Stakeholders

		Moc Chau District, Son La Province		Ly Nhan and Duy Tien Districts, Ha Nam Province	
		No.	%	No.	%
Support from the state and local governments	Priority loan/funds for dairy cattle rising	2	5.0	7	17.5
	Free tax for dairy products	0	0	0	0
	Price support	0	0	1	2.5
	Subsidy (feeds)	2	5.0	0	0
Linkages with financial organisations		4	10.0	18	45.0
Other linkages	Farmers' association	6	15.0	3	7.5
	War veterans	0	0	0	0
	Veterinary service	5	12.5	1	2.5
	Insurance agents	9	22.5	0	0

Source: Survey results, 2017.

Dairy farmers can receive loans from other financial organisations. In Ha Nam, 45% of dairy farmers stated they received financial support from the Vietnam Bank for Agriculture and Rural Development (Agribank) which they used to buy new dairy cows, animal feeds, and even new equipment and facilities. The loan amount ranges from D200 million to D1 billion, with an interest rate of 8%–11.2% in 3 or 5 years. However, in Moc Chau, dairy farmers could not access these funds as much as they expected. About 10% of surveyed farms also receive financial support from Agribank and other organisations amounting from D400 million to D1 billion.

Besides, some dairy farmers in the study sites have linkages with the associations of local farmers and war veterans. Those organisations can support farmers in terms of financial concerns or market power (such as helping farmers negotiate with dairy companies more easily or supporting them in receiving loans or funds from the banks).

Veterinary service can help farmers in vaccination and better management of diseases. A dairy cow costs a fortune when sick; without appropriate treatment, the sick cow may harm the herd's health. Being able to identify and monitor certain health conditions of dairy cattle properly can prevent unfortunate situations. In Moc Chau, the scheme of dairy cow and dairy price insurance has been implemented since 2004 by Moc Chau Milk in collaboration with BAOVIET (Thanh, 2016), one of the biggest insurance agencies in Viet Nam.[6] Each household pays from D200,000 to D600,000 for a calf, a heifer, or a cow. In October 2016, the insurance fund was raised to D20 billion. If there is risk to a cow, the examination board will check up and apply insurance calculation. The board includes representatives of veterinary services, labour unions, households, etc. If the cow dies, farmers will receive around D13 million to D15 million to buy a new calf. Since farmers manage the insurance fund, they will be paid immediately in case their cow dies. Sometimes, the Moc Chau Milk Company can also use the insurance fund to invest in production and pay the bank's interest rate. In addition, with

[6] http://www.baoviet.com.vn/Home

the milk price insurance policy, farmers only need to pay D50 per kg. If the milk price drops too low, 60% of the difference will be subsided.

The percentage of dairy farms in Moc Chau having linkages with veterinary service and insurance agents in Moc Chau is also higher than that in Ha Nam. The figures for Moc Chau are 12.5% and 22.5%, respectively, while those for Ha Nam are only 2.5% and 0%. It means that the linkage between dairy farmers and veterinary service is extremely weak in Ha Nam. Out of 40 surveyed farms, no farm has insurance for dairy cattle.

7. Cost–Benefit Structure of the Value Chain

Farm's Cost–Benefit Analysis

The income of dairy farmers mainly come from milk and accounts for a large proportion of their receipts. Milk receipts per kilogram of milk in Ha Nam were D13,080, accounting for 90.33% of total farm receipts. They were D1,340 higher than those of Moc Chau's D11,740.

In terms of stock sales dairy, the receipt in Moc Chau was a little higher than that of Ha Nam. But the sale of other stock in Ha Nam was higher than that of Moc Chau because besides dairy, Ha Nam often kept male calves for beef. In Moc Chau, the farmers could get some income from cow manure as they sold it to other agricultural farmers nearby.

Overall, the total farm receipts per kilogram of milk in Ha Nam was D1,950 or 15.56% higher than those of Moc Chau.

On production cost, the total variable cost in Ha Nam was much higher than Moc Chau. The total variable cost of Ha Nam per kilogram of milk was D9,920, while that of Moc Chau was only D5,760. In absolute terms, this cost in Ha Nam was D4,160 higher than in Moc Chau. In relative terms, it was 72.2% higher than Moc Chau. This could be explained by the much-higher feed cost in Ha Nam. Purchased feed cost in Ha Nam was D7,840/kg of milk, accounting for 79% total operating cost or 54.14% of total farm's receipts. In Moc Chau, purchased feed cost was D4,960/kg of milk, accounting for 39.5% of farm receipts, which was D2,880 lower than that in Ha Nam. Similarly, the fertiliser, herd, and shed costs in Ha Nam were also much higher than those in Moc Chau. Therefore, the feed-related costs and total variable costs of Ha Nam were quite high compared to those of Moc Chau.

Table 4.19: Farm's Costs and Benefits (D1,000/kg milk)

	Moc Chau District, Son La Province	Ly Nhan and Duy Tien Districts, Ha Nam Province
Cash receipts		
Milk receipts	11.74	13.08
Stock sales – dairy	0.14	0.06
Stock sales – other	0.38	1.34
Other receipts	0.27	0.00
Total Farm receipts	**12.53**	**14.48**
Production costs		
Purchased feed	4.96	7.84
Fertilisers	0.18	0.54
Feed-related costs	***5.14***	***8.38***
Margin over feed-related costs	***6.60***	***4.70***
Herd costs	0.16	0.81
Shed costs	0.35	0.69
Sundry variable costs (miscellaneous)	0.11	0.04
Other variable costs	***0.62***	***1.54***
Total variable costs	***5.76***	***9.92***
Gross margin – milk only	**5.98**	**3.16**
Gross margin – whole farm	**6.67**	**4.56**

Source: Survey results, 2017.

Although milk receipts per kilogram of milk in Ha Nam were higher than those in Moc Chau, the production cost of Moc Chau was lower than Ha Nam. This led to the margin on feed-related costs, gross margin on milk, and gross margin on the whole farm in Moc Chau being much higher than those of Ha Nam. This could imply that even if the farmers could not get high cash receipts, they could still get good economic results if they could manage their production costs well. Therefore, they should concentrate not only on the cash receipts but also pay more attention in reducing the production costs.

Distribution of Profits along the Value Chain

According to the results of the study, the added value seemed to be in favour of dairy farmers with the proportion of 40.6% of the added value along the chain in Ha Nam and 44.4% in Moc Chau. Following were the distributors who earned 32.1% in Ha Nam and 29.7% in Moc Chau; the processor obtained 22.2% in Ha Nam and 23.9% in Moc Chau; and the collector received only a small portion of 5.1% in Ha Nam and 1.9% in Moc Chau. However, to get the added value per kilogram of milk, the farmers had to invest a lot of fixed costs, calculated to around D2,500/kg of milk. In addition, they had to invest for a relatively long time; on average, it took about 3 months to build the breeding facilities and 2 years to raise cattle until the time of milking. Meanwhile, although the value-added ratio of collectors was quite low (5.1%), their initial investment cost was very low (only D55 in Ha Nam and D152 per kilogram of milk). In addition, they collected 2.0 to 2.5 tons of milk per day. Thus, even if the added value per kilogram of milk was relatively low, the actual benefit they receive was quite high.

Table 4.20: Value-added Distribution along the Fresh Milk Chain (per kg of milk)

		Dairy Farmer	Milk Collector	Dairy Plant	Distributor
Moc Chau District, Son La Province	Value added (D)	4,671	201	2,512	3,124
	Share of value added (%)	44.4	1.9	23.9	29.7
Ly Nhan & Duy Tien districts, Ha Nam Province	Value added (D)	4,550	572	2,484	3,600
	Share of value added (%)	40.6	5.1	22.2	32.1

Source: Survey results, 2017.

Distributors received a high proportion, reaching around 30% of added value of the chain, while they had to invest relatively lesser in a short period. In relative terms, they profited the most in the fresh milk chain.

8. Conclusion

Dairy farming has become an important economic activity of Vietnamese farmers even though Viet Nam has no tradition in it. However, its dairy sector is facing some difficulties in terms of milk quantity and quality due to the lack of professionalism and dispersal of dairy farms, and, more importantly, the weaknesses in the linkages among actors and stakeholders in the chain.

Dairy farming in Moc Chau has a longer tradition and a larger production scale and milk yield than in Ha Nam. Overall, the linkages between dairy smallholders and other actors, dairy smallholders, and relevant stakeholders in Moc Chau are stronger.

Moc Chau Milk Company, the only milk company in the region, is dominant in input supply. Conversely, there is no dominant input supplier in Ha Nam and dairy farmers prefer to buy inputs from local markets. In Moc Chau, 35% of surveyed farms have contracts with input suppliers and 27.5% receive support from them. However, there is no figure for Ha Nam.

Milk collectors in both study sites work independently from the dairy plants but, in Moc Chau, they unofficially work under the Moc Chau Milk Company. In Ha Nam, milk collectors do not work under the control of dairy plants (Vinamilk or FrieslandCampina). The percentage of dairy smallholders having contracts with milk collectors in Moc Chau is 42.5%, which is higher than that in Ha Nam (7.5%).

In both study sites, 100% of dairy smallholders had signed contracts with the milk companies. In terms of support, the percentage of those receiving loan and technical support in Moc Chau is also higher than in Ha Nam.

The linkages to relevant stakeholders in both Moc Chau and Ha Nam are quite 'loose'. The proportion of surveyed farms receiving priority loans or funds from the state and local authorities in Moc Chau is lower than in Ha Nam. Ha Nam dairy farms also commonly receive support from financial organisations. Moreover, dairy farms in Moc Chau seemingly receive more support from farmers' associations, and veterinarian service and insurance agents.

Especially in Ha Nam, no dairy farms have linkage with insurance agents, which is extremely risky in dairy cattle farming.

Although milk receipts per kilogram of milk in Ha Nam were higher than those in Moc Chau, the production cost of Moc Chau was lower than that of Ha Nam. This led to the margin on feed-related cost, gross margin of milk, and gross margin of the whole farm in Moc Chau being much higher than those of Ha Nam. Thus, even if the farmers could not get high cash receipts, they still get good economic results if they could manage their production costs well.

In numbers, the added value was higher for dairy farmers than other actors along the chain. However, in reality, the milk distributors profited the most in the fresh milk chain, followed by the collectors because milk distributors and collectors had to invest the smallest amount of capital.

Thus, considering the conclusions above, the following are highly recommended for each study site:

In Moc Chau District, Son La Province:

- Improve the involvement of relevant stakeholders. Because in Moc Chau, dairy farms are dependent mostly on the milk company so that their voice has little power. With the support of stakeholders, they can be more powerful.

In Ly Nhan and neighbouring Duy Tien districts, Ha Nam Province:

- Dairy farmers should more actively join in the chain. They need to sign longer-term contracts with milk collectors and interact more with dairy plants and actively ask for support from relevant stakeholders.
- Dairy plants need to consider providing more technical support and training courses for farmers. Those are the long-term assets to help boost milk quantity and quality and they are affordable by the firms' resources. Also, dairy plants in Ha Nam should try to sell inputs and consume outputs from dairy farmers.
- Stakeholders should improve the links by providing essential support for farmers; governments especially need to regulate and encourage all actors and other stakeholders to join the chain.

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