

Sales and Marketing of Fresh Milk by Smallholder Dairy Farmers in West Java

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Abstract. As a highly perishable product, sales and marketing are very important for fresh milk produced by dairy farmers. This paper aimed to analyze the sales and marketing of fresh milk done by smallholder dairy farmers in West Java. Data used in this paper is a part of the IndoDairy Smallholder Household Survey (ISHS) data collected during August–September 2017, covering 600 smallholder dairy farm households in Bandung, Garut, Cianjur, and Bogor Regencies. Descriptive statistic analysis using tabulation was employed to process the data. Almost all the dairy farmers sold fresh milk, except one in Bogor who sold milk in the form of processed milk. Almost all farmers (98 percent) sold their fresh milk to dairy cooperatives, showing dairy farmers' strong dependency on the dairy cooperatives. The price of fresh milk received by the farmers ranged from Rp4,794/L (Bogor Regency) to Rp4,212/L (Cianjur Regency), giving an average of Rp4,459/L. Due to the strong dependency on the dairy cooperatives, it is important to strengthen dairy cooperatives' management capacities to help dairy farmers improve their milk quality, and hence prices, as well as dairy farmers' welfare.

Keywords: fresh milk, sales, marketing, price, smallholder, cooperative.

1. Introduction

West Java is the second largest milk producing center in Indonesia after East Java Province. In 2017 its fresh milk production amounted to 310,461 tons or 33.45 percent of fresh milk production in Indonesia with dairy cow population of 115,827 heads or 21.43 percent of total dairy cow population in Indonesia [1].

Majority of dairy farmers in West Java was small-scale dairy farmers with average dairy cow ownership of 3–4 heads. The number of dairy cows held by the farmers ranged from 1 to 70 or more. However, dairy farms with 1–3 cows still dominated [2]. The small-scale of dairy farms was caused by limited capital and farmer's ability to find grass/forage for feed.

Fresh milk as the main product of dairy farming is highly perishable. Therefore, fresh milk produced by farmers must be handled properly and as soon as possible marketed through a cold chain. Inadequate handling will cause short shelf-life and low selling price, which will affect dairy farmers' income.



The decline in fresh milk quality when it is received by the dairy processing industries, which result in lower price, is one of the main problems faced by dairy farmers in Indonesia. Because of the oligopsonistic structure of the fresh milk market, the role of dairy cooperatives is very important as mediators between dairy farmers with milk processing industries.

2. Methodology

Respondents and research locations

Data used in this paper is a part of the IndoDairy Smallholder Household Survey (ISHS) data which was gathered within a collaborative project between Indonesian Center for Agricultural Socio Economic and Policy Studies (ICASEPS) and Australian Centre for International Agricultural Research (ACIAR). Data was collected during August–September 2017, covering 600 smallholder dairy farm households in Bandung (300 respondents), Garut (140 respondents), Cianjur (80 respondents), and Bogor Regencies (80 respondents).

Farmers included in the survey were those selected randomly from farmer population which was the number of total farmers/cooperative members in the location (KPBS Pangalengan, Bandung Regency; KPGS Cikajang, Garut Regency; KPS Cianjur Utara, Cianjur Regency; KUD Giri Tani and KPS Bogor, Bogor Regency) after removing farmers who did not have cows anymore. In this study, all farmer-respondents were chosen in such a way that only farmers who had lactating dairy cows were taken randomly as respondents.

Data analysis

Descriptive statistic analysis using tabulation was used in processing the data.

3. Results and Discussion

Sales and marketing of fresh milk

Fresh milk is the main product of smallholder dairy farms. **Table 1** shows that all farmers sold fresh milk, except one farmer in Bogor Regency who sold milk in a processed form. In addition to fresh milk, some farmers also sold milk in its processed form, such as pasteurized milk, flavored milk, and yogurt. However, there was no farmer who processed fresh milk into sweetened condensed milk.

Table 1. Types of milk product sold by smallholder dairy farmers in the study sites (no. (%)¹), 2017

Types of milk product	Bandung	Garut	Cianjur	Bogor	Total
Fresh milk	300 (100)	140 (100)	80 (100)	79 (99)	599 (100)
Pasteurized milk	0 (0)	0 (0)	0 (0)	3 (4)	3 (1)
Flavored milk	0 (0)	0 (0)	0 (0)	3 (4)	3 (1)
Yogurt	1 (0)	0 (0)	0 (0)	3 (4)	4 (1)
Sweet condensed milk	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Source: Primary data, 2017

Note: ¹Percentage of total farmer-respondents in each study site (Bandung, Garut, Cianjur, and Bogor Regencies, and total)

As depicted in **Table 2**, the majority of farmers sold fresh milk to one buyer (94% of the total respondents). In Bandung Regency farmers who sold to only one buyer even reached 99 percent, while in Garut Regency it reached 98 percent. The locations of dairy farms in Bandung and Garut Regencies are relatively far from urban / end consumers, so marketing access is relatively more limited. Unlike the case of farmers in Cianjur and Bogor Regencies, which are close to urban and also tourism areas, access to marketing is more open with more marketing channel alternatives. Therefore, in the two locations, there were more farmers selling fresh milk to two or more buyers.

The main buyers of fresh milk produced by farmers were dairy cooperatives operating in their respective regions. In Bandung Regency, all farmers (100%) made KPBS Pangalengan the main buyer of fresh milk they produced. Likewise, in Garut and Cianjur Regencies the proportion of farmers who

made dairy cooperatives in their regions (KPGS Cikajang and KPS Cianjur Utara, respectively) the main buyers for their fresh milk was very high, almost 100 percent. Meanwhile, in Bogor Regency, the proportion of farmers that made cooperatives in the region as main buyers were less. This was mainly because some farmers in Cijeruk Subdistrict, Bogor were not members of the dairy cooperatives, so they were freer in selling the fresh milk they produced. The proportion of farmers with dairy cooperatives as primary buyers was higher in Cisarua Subdistrict, Bogor and its surrounding areas, which were operational areas of the KUD Giri Tani.

Table 2. Sales of fresh milk by farmers in the study sites, 2017

Description	Bandung	Garut	Cianjur	Bogor	Total
No. of buyers in the last 12 months, no. (%) ¹					
1	297 (99)	137 (98)	71 (89)	60 (76)	565 (94)
2	3 (1)	3 (2)	9 (11)	18 (23)	33 (6)
≥3	0 (0)	0 (0)	0 (0)	1 (1)	1 (0)
Total	300 (100)	140 (100)	80 (100)	79 (100)	599 (100)
Main buyer, no. (%) ¹					
KPGS Cikajang	0 (0)	139 (99)	0 (0)	0 (0)	139 (23)
KUD Giri Tani	0 (0)	0 (0)	0 (0)	59 (75)	59 (10)
KPS Cianjur Utara	0 (0)	0 (0)	78 (98)	0 (0)	78 (13)
KPBS Pengalengan	300 (100)	0 (0)	0 (0)	0 (0)	300 (50)
KPS Bogor	0 (0)	0 (0)	0 (0)	9 (11)	9 (2)
Other dairy cooperatives	0 (0)	1 (1)	0 (0)	0 (0)	1 (0)
Milk processor	0 (0)	0 (0)	1 (1)	1 (1)	2 (0)
Other dairy farmers	0 (0)	0 (0)	0 (0)	1 (1)	1 (0)
Trader/loper	0 (0)	0 (0)	0 (0)	3 (4)	3 (1)
End consumer	0 (0)	0 (0)	1 (1)	3 (4)	4 (1)
Others	0 (0)	0 (0)	0 (0)	3 (4)	3 (1)
Total	300 (100)	140 (100)	80 (100)	79 (100)	599 (100)

Source: Primary data, 2017

Note: ¹ Percentage of total farmer-respondents in each study site (Bandung, Garut, Cianjur, and Bogor Regencies, and total)

As members of the cooperatives and enjoy cooperatives' services, dairy farmers are obliged to sell the milk they produce to cooperatives. However, due to higher price, some farmers also sold their milk to "illegal traders". For dairy farms located in urban and tourism areas, as in the case of KUD Giri Tani and KPS Bogor, the rule not to sell to other parties than cooperatives was hard to implement because farmers can receive much higher price for their milk from their direct milk consumers (households, café/restaurants, small-scale milk processing industries). This became a problem for the cooperatives to meet the amount of milk supply in accordance with the partnerships contract arrangement with milk processing industries.

The price units of fresh milk varied among research locations, namely Rp/L and Rp/kg. It could even differ in one research area. In Bandung Regency, the unit of fresh milk price received by farmers who deposited their milk at the conventional milk collection point (MCP) was Rp/L, while farmers who deposited their milk in the modern milk collection point (MCP) received the price of milk in Rp/kg. In Garut and Cianjur Regencies farmers received the price of milk in Rp/L. Meanwhile, KUD Giri Tani, which operates in Cisarua Subdistrict, Bogor, set the price of fresh milk in a unit of Rp/kg. If we consider conversion factor from liter to kilogram, the price of fresh milk in Rp/kg unit is slightly higher than in Rp/L due to the milk density which is >1 (around 1.02–1.03). However, due to the slight difference, it is assumed in this study that the two units are equal and interchangeable (in liter).

Table 3 shows that the average price of fresh milk varied among research locations, ranging from Rp4,212/L to Rp4,794/L, with the overall average price being around Rp4,459/L. If seen in more detail, the prices of fresh milk in all study locations ranged from Rp3,400/L (Garut Regency) to Rp10,000/L (Bogor Regency).

Comparing the average prices of fresh milk among research locations, it appeared that the average price of fresh milk in Cianjur Regency was the lowest (Rp4,212/L). According to the KPS Cianjur Utara management, the low price of fresh milk was caused by the small-scale business of the cooperative which led to inefficient operational costs. Therefore, the costs had a relatively large proportion in the structure of the price of fresh milk. The high overhead cost of KPS Cianjur Utara was charged to farmers, so the price of fresh milk received by farmers was relatively low. In Cianjur Regency, the price determination of fresh milk purchased from farmers was based on the quality of the milk, ranging from Rp3,900/L to Rp4,200/L. However, some farmers also sold fresh milk directly to consumers so that the price received was much higher than that received from the cooperative, which could reach Rp8,000/L. Therefore, increasing the coverage and quality of KPS Cianjur Utara's services is a requirement to increase the 'loyalty' of dairy farmers to deposit fresh milk to the cooperative so that in turn increases the scale of cooperative business, reduces overhead costs, and increases the price of fresh milk received by dairy farmers.

Table 3. The price of fresh milk received by farmers in the study sites, 2017

Description	Bandung	Garut	Cianjur	Bogor	Total
Average unitary price received from main buyer in the last 12 months (Rp/L), mean (SD)	4,515 (231)	4,291 (163)	4,212 (577)	4,794 (584)	4,459 (390)
Average highest price received from main buyer in the last 12 months (Rp/L), mean (SD)	4,676 (252)	4,384 (184)	4,306 (564)	4,888 (997)	4,586 (0)
Average lowest price received from main buyer in the last 12 months (Rp/L), mean (SD)	4,304 (300)	4,175 (229)	4,075 (408)	4,794 (584)	4,308 (408)
Get paid based on the quality, no. (%)	295 (98)	135 (96)	75 (94)	10 (13)	515 (86)

Source: Primary data, 2017

The average price of fresh milk in Garut Regency was also relatively low, which was around Rp4,291/L, with a range of Rp3,400/L to Rp5,000/L. Similar to Cianjur Regency, the price of fresh milk set by KPGS Cikajang was based on the quality of fresh milk. The low price of fresh milk received by farmers was caused by the relatively low quality of fresh milk, inadequate cooling units, and relatively high operational costs, given the extensive KPGS Cikajang work area with poor quality road infrastructure.

One of the factors that played a very important role in determining the price of fresh milk in this region was the high total plate count (TPC) in milk. The high value of TPC of fresh milk in this region was due to the very limited availability of water, which greatly affected the cleanliness of the cages and dairy cows, which caused high microbial content in fresh milk. This was exacerbated by inadequate cooling units, where cooling facilities were only found in the KPGS Cikajang location, in spite of scattered and long-distance and travel time from the farmers' location. Thus, during the trip from the farmers' location to the KPGS location, the microbial content of milk increased very rapidly.

KPBS Pangalengan also set the price of fresh milk received based on the quality of milk. The price received by farmers ranged from Rp3,650/L to Rp5,400/L. In this region, in general, the quality of milk was fairly good. Some of the fresh milk produced even had a very low amount of TPC, around 200–300 thousand cfu/ml. Furthermore, modern milk collection point (MCP) facilities for assistance

from PT Frisian Flag in several locations were equipped with cooling facilities that maintained the quality of milk to reach the milk processing industry.

KUD Giri Tani di Kabupaten Bogor was the only dairy cooperative which set the price of fresh milk at farmer level in a flat price system, that was one price at Rp4,600/kg. According to information received from the cooperative management, flat pricing was an agreement with farmers who did not want to be bothered by milk quality and price problems. However, the flat price system conceptually does not provide incentives for individual farmers to improve the quality of milk produced.

In Bogor Regency, the price of fresh milk received by farmers was higher, especially for farmers who were members of the Mandiri Sejahtera Farmer Group. The high price of fresh milk received by farmers was due to the relatively good quality of milk, in addition to owning their milk processing unit (yogurt) themselves, so the marketing chain was very short. Some farmers also sold milk directly to consumers.

Most farmers (80% of the total respondents) stated that they did not have certain contracts with the main buyers, neither oral nor written (**Table 4**). However, some others stated that there were oral contracts (14%) or written contracts (6%). According to the farmer who stated that there was a contract, oral or written, the most important clause of the contract was related to the quality of fresh milk, inputs provided on credit (food, medicine, vitamins, supplements), and obligation to supply to buyers.

Table 4. Contract between dairy farmers and main buyers of fresh milk in the study sites, 2017

Description	Bandung	Garut	Cianjur	Bogor	Total
Having a written or verbal contract with main buyer, no. (%) ¹					
Yes, written	28 (9)	1 (1)	6 (8)	0 (0)	35 (6)
Yes, verbal	47 (16)	17 (12)	14 (18)	5 (6)	83 (14)
None	225 (75)	122 (87)	60 (75)	74 (94)	481 (80)
Total	300 (100)	140 (100)	80 (100)	79 (100)	599 (100)

Source: Primary data, 2017

Note: ¹Percentage of total farmer-respondents in each location (Bandung, Garut, Cianjur, and Bogor Regencies, and total)

According to the KPBS Pangalengan management, actually the cooperative's AD/ART states that farmers who are members of KPBS Pangalengan and receive facilities from the cooperative are obliged to sell the fresh milk they produce to the cooperative. However, it seems that in general farmers did not know this. Farmers' obligation, who are members of cooperatives and receive facilities and services from cooperatives, to deposit fresh milk they produce was also conveyed by the management of KPGS Cikajang and KPS Cianjur Utara. The KPGS Cikajang officials complained about 'illegal' traders who secretly bought fresh milk from the cooperative farmer-members. Aside from reducing milk deposits to cooperatives, it also damaged the milk market because the 'illegal' traders dared to buy low-quality fresh milk at a relatively high price. The trader mainly operated in the operational areas of the cooperative located far from the KPGS Cikajang site. Meanwhile, in Bogor Regency, both KUD Giri Tani and especially KPS Bogor management tended to allow their farmer-members to sell fresh milk to other buyers than the cooperative as long as their obligations to the cooperatives were fulfilled.

Dairy cooperatives and fresh milk sales and marketing

In addition to being the parent organization of smallholder dairy farmers, the cooperative also acts as a mediator or intermediary between farmers and the milk processing industries. The farmers deposit fresh milk to the cooperative, where they are members, and then the cooperative will sell the fresh milk to the milk processing industries. One dairy cooperative can supply more than one dairy processing industries. In 2017, KPBS Pangalengan supplied PT Frisian Flag Indonesia (33%), PT Ultrajaya (52%), PT Indolacto (2%), cooperation's processing unit (11%), and the rest 2 percent was

locally processed by home industry in Bandung. KPGS Cikajang supplied PT Indolacto (80%), PT Ultrajaya (20%), and only 1 percent was supplied to the local market. KPS Cianjur Utara supplied Cimory (80%), while the rest 20% was sold as fresh milk (direct consumers) and cooperative products. Meanwhile, almost all the milk supply of KUD Giri Tani went to Cimory. KPS Bogor supplied PT Cimory (12 tons/week), PT Indolacto (9–10 tons/day), PT Unifarm (9–10 tons/week), and SMEs (800 L/day).

As a result of economies of size, dairy processing industries are generally large and few in number, which put processors at a bargaining advantage over independent farmers [3-5]. The bargaining position of dairy farmers against the dairy processing industries will be stronger with the presence of cooperatives as intermediaries as a result of a bilateral-monopoly relationship between dairy cooperatives and dairy processing industries [6]. However, evidence of the bargaining power impact of cooperatives is hard to obtain, due to data constraints and the strategic response of noncooperative firms [6]. Still, a number of studies have shown that the existence of cooperatives has led to higher prices for farmers compared to the situation where no cooperatives existed [7,8]. Furthermore, cooperatives can reduce transaction costs [8-10].

To increase added-value of milk and to reduce dependency on milk processing industries, some cooperatives processed fresh milk into some milk products such as pasteurized milk, yoghurt, mozzarella cheese, etc. However, they still had problems, both in production and marketing aspects. In the production aspect, they had problems with human resources and processing facilities. Furthermore, they also had problems in getting production license, as in the case of KPS Cianjur Utara, because of more rigid regulation for milk products. In the marketing aspect, they also had problems with unorganized market and limited access to the market.

Poor dairy cooperative management practice leading to mismanagement is another problem in dairy agribusiness. In spite of their role as mediators/intermediaries between dairy farmers and milk processing industries, dairy cooperatives have several weaknesses, among others [11]: (1) low management efficiency causing high handling costs, (2) less professional and unreliable human resources (moral hazard), (3) lack of transparent management and family management (family-related managers), (4) weak bargaining position against milk processing industries, (5) not fully in favor of farmers, and (6) weak competition power [12]. Furthermore, poor cooperative manager and staffs' knowledge has made them not optimal in doing their tasks [12].

In order for cooperatives to grow and develop, the principle of loyalty and integrity (trust) is an important key. Strengthening dairy cooperatives' management capacity is required. Therefore, professional and reliable cooperative human resources who have high business instincts and are committed to prioritizing cooperative interests above personal interests are needed. In addition, cooperatives are also required to strengthen networking with milk processing industries [13].

4. Conclusions

Due to small-scale and location-spreading characteristics of the dairy farmers and highly perishable characteristics of milk, the smallholder dairy farmers are highly dependent on dairy cooperatives and milk processing industries, and therefore, they have low bargaining position. In this context, dairy cooperatives must be able to better represent dairy farmers' interests, to position themselves as inputs and services providers, fresh milk buyers as well as marketers that favor farmers, so that to increase the spirit of farmers in running a dairy farming business. It is, therefore, important to strengthen dairy cooperatives' management capacity to help dairy farmers' improve their farming practices, productivity and milk quality, and hence prices, as well as dairy farmers' income and welfare.

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