Production Technology and Efficiency of Farmer's Dairy Entreprises (A Case Study in the Regency of Bogor, Boyolali, and Pasuruan)

Teknologi Produksi dan Efisiensi dari Perusahaan Susu Petani (Studi Kasus di Kabupaten Bogor, Boyolali, dan Pasuruan)

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ABSTRACT

During for the past 10 years, milk production in Indonesia has been on the increase of approximately 70% (FAO, 2002), but it can only meet 30% of domestic needs for milk. The remaining 70% is still imported, mostly from Australia and New Zealand. Milk production in Indonesia is expected to increase to achieve an average of 15-20 liters/cow/day. It is necessary to analyze dairy enterprises to assess its feasibility. The objectives of this study were: (1) to evaluate production technology of small holder dairy farm in West Java, Central Java and East Java; (2) to analyze the efficiency of the existing dairy farming. Twenty farmers from each localities with ownership less than or equal to 10 cows, consisted of small (<4 cows), medium (4-6 cows), and large (> 6 cows) scales were interviewed on their businesses. Economic analysis on net profit indicated by BC-Ratio, and IRR values. The dairy farming in West Java, Central Java and East Java was carried out traditionally without technological diversification, the main products were pasteurised fresh milk. Milk production was low (10 liters/cow/day). Net income of Rp 1,521,820/m/farmers, BC-Ratio 1.32, and IRR 17% indicated a low result. Improving cows ownership should be in line with the improved management and technology application.

Keywords: Milk production, Efficiency, Small holder, Dairy farm.

INTRODUCTION

During for the past 10 years, milk production in Indonesia has been increased, but it can only meet 30% of the domestic needs for milk. The remaining 70% is still imported from other countries, i.e., Australia and New Zealand. Recent report from New Zealand (Feedinfo News Service, 2010) stated that milk production was estimated high, of approximately 16.9 million ton in 2010, and would increased 10% into 18.6 million tons in 2011. Milk production in Indonesia is expected to increase through implementation of a number of strategies such as improved management and population of dairy cattle as well as technology improvement especially on the handling and processing part of production. To meet the needs of consumers for fresh milk, population of dairy cattle within the next 5-10 years should be about 2-3 million cows with the average production of 15-20 liters /cow/day. The average milk production per cow is still below 3,500 kg / cow / lactation or 10 liters /cow/ day, and is expected to be improved (Statistic 2009).

Condition of dairy farm in Indonesia, most are small in size, joined with other business and associated with Gabungan Koperasi Susu Indonesia (GKSI). However, until now the productivity of dairy cattle has always been low due to various constraints such as the average farmers' ownership of

cattle that ranges only from 3-4 cows / family with a productivity of approximately 9-10 liters/day.

Another cause of the low productivity of dairy cows in Indonesia is that about 95% of dairy cows managed by the farmers have the following common conditions: 1) low-quality human resources, 2) limited land ownership (<1 ha /family) with a low socio-economic condition, making it difficult to expand their business, 3) traditional business orientation (side job); 4) limited infrastructure, and 5) lack of access to information and technology. In this case, Bruckmaier and Wellnitz (2008), sugested that enviroment had great effect on milk production for which milk ejection was important to be considered in dairy farming conducted under different farming system.

The farmer's business in dairy farming has a great opportunity to be developed in line with the increase in milk consumption, guaranteed markets, the availability of potential land for dairy cows outside Java, capital providers, technology availability, IB services and embryo transfer, and institutions such as cooperatives to accommodate dairy products and processed products. According to Mandaka and Hutagaol (2005) and Rusdiana and Sejati (2009), institutional support, such as Cooperation will be needed to help in the management of production; handling and marketing process.

A number of policies have been made by the government, in this case, by Animal Husbandry Agency, to improve efficiency, productivity and quality so as to be able to compete in national and international markets. In order to strengthen the farmer's business capital, the government has issued SKIM, Food Security Credit (CTF), and has also facilitated other capital assistance.

The various technical policies aimed at increasing population, production, productivity of dairy cows and the development of livestock farming, especially dairy cows, it is necessary to analyze the dairy cow business in some potential areas to find out the feasibility of the business managed by a group of dairy farmers. The

result should serve as a source of information and guidance in establishing policies on the dairy farming development to be efficient and economical.

The objectives of this study were to evaluate the production technology and the scales of the dairy cattle farming in the provinces of West Java, Central Java and East Java, and to analyze the efficiency of the existing dairy farm run by small holding farmers.

MATERIAL AND METHODS

This activity was conducted in the provinces of West Java, Central Java and East Java, the locations of which were determined based on the business centers of the dairy cattle farming in Megamendung, Kebon Pedes (Bogor, West Java), Boyolali sub-district, Boyolali regency (Central Java) and Pasuruan, Pasuruan regency (East Java). The information was obtained through observations on the sites, interviews with farmers, literature reviews and reports related to the dairy enterprises. The data obtained was analyzed to see the economic feasibility of their business, presented descriptively, including the business constraints and alternative solutions to come up with policy recommendations. The primary data collected in this study was the main data consisting of farmers with business conditions, including, among others, individual characteristics, ownership of business assets, business management (allocation of labor, management and marketing), business costs, and business revenue.

The population of all dairy cow farmers in the selected location with a business scale of less than or equal to 10 cows was identified. Samples were taken using a stratified simple random from dairy farmers in each area with a total sample of 20 farmers for each stratum. The business scale strata of each sample region consisted of small (<4 cows), medium (4-6 cows), and large (> 6 cows) scales.

The analysis conducted was a descriptive and analytical finance. Financial study aimed to compare the level of profitability and business efficiency of each scale. The business analysis was done by using net profit indicators, BC-Ratio, and IRR.

RESULTS AND DISCUSSION

Characteristics of Dairy Farmers

In general, the farmers in the Regency and the Municipality of Bogor finished elementary school education (50% involved in small and medium-scale dairy farms and 30% in large-scale farms). The farmers with secondary school education was 20% involved in small-scale dairy farms, 30% in the medium-scale and 40% in the large-scale. The farmers with senior high education was 30% involved in small-scale dairy farms and 20% in the medium/-large scale ones. The farmers with higher education were only found in large-scale dairy enterprises with a total of 10%. In Boyolali regency, most farmers completed elementary school education (85% involved in small-scale dairy farms, 75% in the medium-scale, and 60% in the large-scale). Five percent (5%) of the farmers with secondary school education were involved in the small-/large-scale dairy farms and none were involved in the medium-scale dairy farms. The farmers with senior high education who were involved in small-scale dairy farms were 5% and those who were involved in the medium-/large-scale ones were 25%. The farmers with higher education were only found in large-scale dairy farms, which were about 5%. These figures indicate the roles of farmers education in the determination of bussines scale in the dairy enterprises, which was varied between regions.

The average age of small-scale dairy farmers in Boyolali was 40 years old while farmers involved in medium-/large-scale dairy enterprises was aged 45 and 49 respectively. The persentase of farmers within productive ages (20-55 years) in Boyolali preferred to be dairy farmers (90%, 80% and 60% for each scale) compared to post-productive ages (>55 years). Farmers in Grati had the same average age (41 years old) for those who were involved in the small-scale and the medium-scale dairy cows, while the average age for those in the large-scale was 44. In terms of age, the majority of the farmers (>90%) were classified into productive ages, even on the small scale the number of productive ages reached 100%.

Generally, the farmers in Grati had elementary school education (91% for small scale, 85% for medium scale, and 70% for large scale). The number of the farmers who had secondary school education was 8% for medium scale and 10% for large scale. The farmers with high school education were about 20% for large scale, 8% for medium scale and 9% for small scale.

Regarding farmers experience, the farmers in Bogor and Pasuruan regencies had the same average farming experience of 11 years for the small scale and 13 years for the medium scale. For the large scale Bogor regency and Bogor city had an average of the longest raising experience compared to the other 2 regions, namely 20 years. The labor used in raising dairy cattle included local labor and non local labor. The dairy cattle in Boyolali regency had an average use of local labor or family on small-scale dairy business more than the two other regencies (as many as 2 people). For the small-scale dairy cattle, the three regencies did not use any non local labor. The family labor used in the business of dairy cows in Bogor and Boyolali had the same average number of persons, that is, 2 people, while in Pasuruan the average was only 1 person. Using outside labor in the business of dairy cattle was found only in Bogor regency (1 person). The use of labor in the family was found in the large scale in the three regions with the same average of 2 people. Bogor regency had the biggest average use of outside labor, that is, 2 people, while Pasuruan generally did not use any outside labor.

Business Characteristics

The small-scale farmers in Bogor made dairy farm as their main occupation (45%), and that was also true for the medium-scale (85%). For the large scale only 30% who made dairying as their main job. The main occupation of the people involved in small-scale dairy business in Boyolali was a rice farmer (55%) made the cow was only as sidejob is 80%,because the farm was legacy family business and considered to still profitable. Those who considered medium-scale and large-scale farming activities as their main job reached 35% and 60% respectively. Forty percent (40%) of respondent who raised cows as their side job, prefered medium scale enterprises.

Dairy cattle business in Indonesia is dominated by dairy businesses of small and medium scales. According to Erwidodo (1993) in Ratnawati (2002), dairy business in Indonesia had a composition of small-scale farmers (less than 4 cows) that reached 80 percent, medium-scale farmers (4-7 cows) 17 percent, and large-scale farmers (more than 7 cows) 3 percent. With an average cow ownership of 3-5 cows per farmer, the level of business efficiency was still low. If the scale of cow ownership was increased to 7 cows per farmer, it is expected that it would be able to boost business efficiency around 30 percent (Swastika, *et al*., 2000).

The farmers in Pasuruan made dairying as their main job, especially on the medium to large scales. Small-scale farmers who made dairying as their main business totaled 45%. The farmers whose main job were rice farmers were on the same percentage (45%).

The scales of dairy cattle ownership in Bogor varied from small scale (an average of 4 cows), medium scale (an average of 9 cows), to large scale (an average of 14 cows). In the regencies of Boyolali and Pasuruan, the average cattle ownership was a bit different compared to in Bogor in terms of the numbers. In Boyolali, small-scale dairy farms had an average of 5 cows, medium-scale 7 cows, and large-scale 15 cows. In Pasuruan, small-scale dairy farms had an average of 4 cows, the medium-scale 7 cows, and the large-scale 9 cows.

The dairy cows in Bogor regency were 100% owned by the farmers themselves. Similarly, in Pasuruan regency the dairy cows were 99.1% owned by the farmers themselves, and the ownership status of the remaining 0.9% is called *gaduhan*. In Boyolali regency, the ownership status was dominated by "self" ownership that reached 98%, and 2% of the remaining ownership belonged to *gaduhan*.

Production Technology

Raising dairy cattle has been done intensively by providing a special stable. However, every region has its own way in making a stable. The farmers in Bogor generally make a stable from long-lasting materials so that they can last up to 17 years, whereas the farmers in Boyolali generally use materials that are not so durable, with the economic life of about 7 years. The farmers in Pusuruan use materials which were relatively stronger compared to the farmers in Boyolali.

The feed used by farmers included tofu waste and the concentrate bought from traders or cooperatives, but some farmers used a combination of tofu waste, rice bran, cassava and ready concentrate. The forage crops used included wild grass, king grace grass and *rumput gajah* (elephant grass), and some farmers even used cassava leaves. The grass was obtained around and outside the dairy cattle site or the farmers bought the grass from sellers who came to their place. In Bogor, most farmers did not have grass gardens, while the farmers in Pasuruan and Boyolali generally had their own grass gardens both for superior grass and the mixed ones. The average ownership of grass gardens in Boyolali was about 2,500 m^2 while in Pasuruan reached about 1 ha per farmer.

Product Handling

After milking process, the milk was transported using milk cans or buckets and

finally it was ready for sale. Of the total fresh milk produced by dairy farmers, only a small amount was used for their own consumption or for additional feedstuffs while most of it was for sale. The study results showed that there were three marketing channels of fresh milk from farmers: Cooperative (KUD), agent/delivery agent, and farmers directly to consumers. From the agent / delivery agent, milk was marketed directly to consumers while fresh milk from cooperatives was directly marketed to the dairy processing industry (IPS) or Milk Treatment / Milk Centre (MT / MC). MT/ MC which serves as middleman to the producers of milk in the farmer level with IPS and as milk processing industry in such a way that meets the quality standard in accordance with the provisions of the government proposed by the IPS. According to Rusdiana and Sejati (2009) empowering milk cooperation may help in the improvement of milk production as well as its quality.

Milking was done more than twice a day, usually done on cows with a high production of more than 25 liters/day. In Bogor, milking was carried out in the morning at 5:00 and in the afternoon at 15.00. In Boyolali and Pasuruan, the milking time was the same, in the morning at 4:30 and in the afternoon at 15.30. An increased frequency of milking cows may increase milk productivity(Wall and Fadden, 2008). Extended milking intervals and frequencies was rarely conducted by farmers in the three regions. This type of management strategy was suggested by some reseacher as good method to increase milk production. Research conducted at Livestock Research Institute in Denmark said the increase in dairy cow milk production capability on the average of 154.78% could be done by increasing the frequency of concentrate giving and milking from 2 times to 4 times a day and night (Mc Cullough, 1973).

Financial Analysis

The average raising costs of dairy cows such as feed, mating, medicines, and other operational costs, in Bogor Regency, were Rp 908,831, Rp 1,632,757 and Rp 2,832,679 per month for small, medium and large scale respectively in Boyolali Regency were Rp 1,036,725, Rp 1,401,575 per month and Rp 4,134,680 per month for small, medium and large scale. Where the average raising costs of dairy cows in Pasuruan were Rp 582,750 per month for small scale, Rp 943,448 per month for medium scale and Rp 1,651,157 per month for large scale. These exper considered average and slaughtly varied between regions due to different regional potency and varied input given to the animals.

The income of dairy farmers was derived from milk production and sales of cattle (male calves), cattle fattening and rejected milk. The highest average daily milk production of dairy farmers in Boyolali was 60.0 litres, while the lowest in Bogor was 21 litres, and in Pasuruan the average was 56 litres. The yearly average business turnover of dairy cows for the farmers in Bogor ranged from Rp 10,359,000 to Rp 84,456,000, Boyolali Rp 12,616,000 to Rp 114,446,000, and in Pasuruan Rp 13,081,500 to Rp 59,570,200.

The low milk production, has consequenlty resulted in the income of farmers which was associated with many factors. Mandaka and Hutagaol (2005) reported that some factors influencing milk production in Kebon Pedes, Bogor included human labour, technology appolication and economic capability of farmers.

Based on the calculation of net income,there were still some farmers who suffered losses. For farmers in Bogor and Pasuruan, the profitable scale was the large scale (>6 cows), whereas in Boyolali the most profitable was the medium scale (4-6 cows).AccordingHusnanandSuwarno(1999); Prastiawan (2003),that the businessis saidfeasibleif it has BC ration> 1.

Financial calculation showed that dairy enterprises still had a relatively low level of feasibility. The maximum BC- Ratio Value that could be achieved was 1.35, while the IRR value was about 17%. The obstacles

encountered in the development of dairy cattle agribusiness were, among others, the inability of dairy cattle farmers to develop their business due to their low income. The income they usually earned was only enough to make ends meet, making it unable to develop dairy cattle agribusiness. The research conducted by Sugiarti et al. (1999), in Bandung Regency (Pengalengan, Lembang) and Bogor (Cisarua) showed that the average income of dairy agribusiness was Rp 633,903 per month with the average number of parent ownership throughout the year of three cows. In the meantime, the research conducted by Kusnadi et al. (2004), in Cirebon with the average raising of two parent dairy cows, the average income reached Rp 796,580 per month.

CONCLUSION AND SUGGESTION

Conclusion

(1) Activity of dairy farm in West Java, Central Java and East Java carried out and managed traditionally, by smallholder farmers.

(2) The average of milk yield was low (10 litres /cows/day) because some major constraints related to feeding, management and processing technology and less skill of dairy farmers to implement good farming practices in related fields.

(3) Based on the results of economic analysis, the feasibility of dairy enterprises in the selected regions was predominant at low level associated with low income received by farmer.

Suggestion

Considering the regional and human resource potency in each region, policy and efforts to improve technology, product diversification, and appropriate management on a larger bussiness scale will be of importance.

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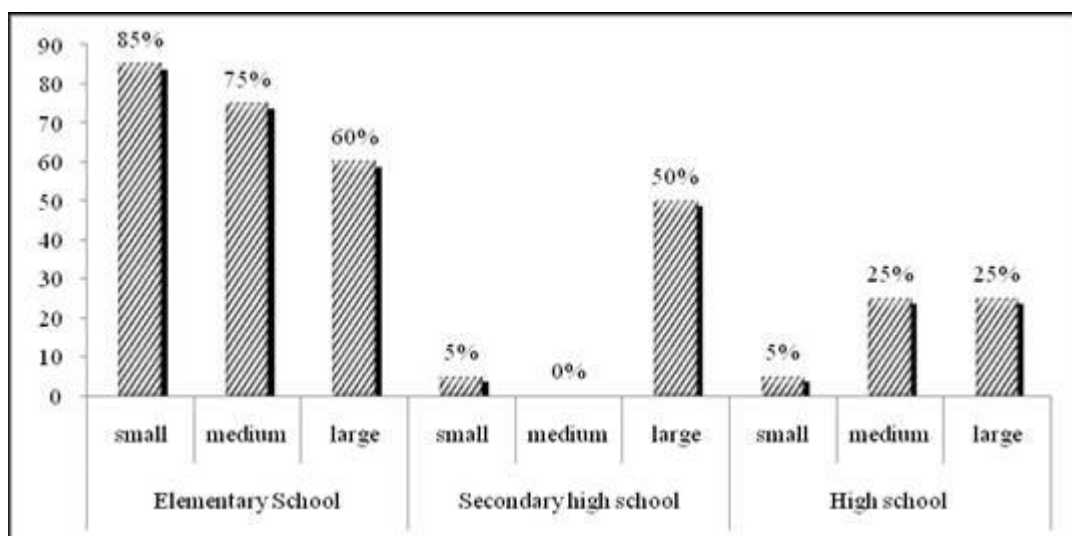
Figure 1. Percentage of Farmers Characteristics Based on Education and Scale Level in Boyolali
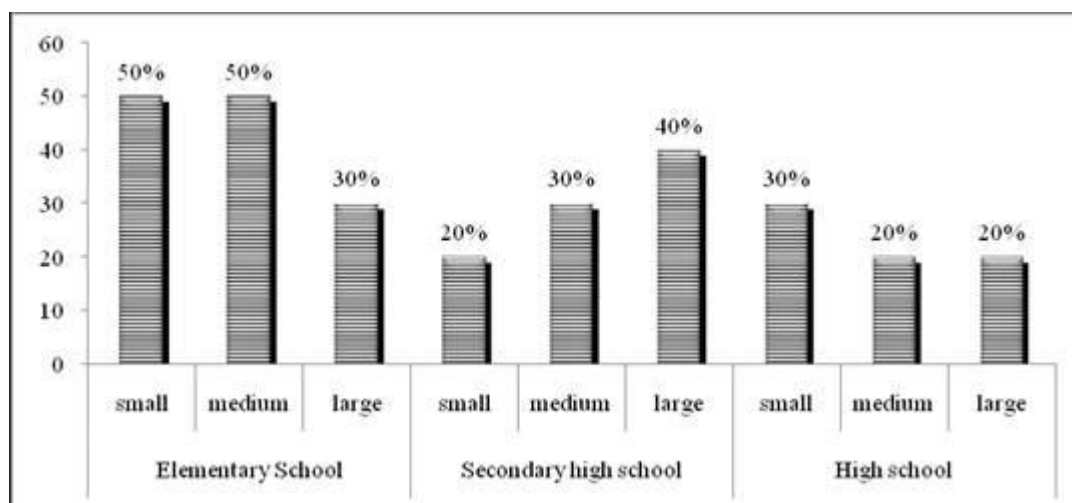

Figure 2. Percentage of Farmers Characteristics Based on Education and Scale Level in Bogor

Table 1. The Average Income, IRR, BC-Ratio and Payback Period in Selected Region

No	Feasibility Indicators	Values
1	Profit (Rp)	8.560.000 ± 10.310.000
2	IRR	36% ± 26%
3	BC-Ratio	1.3 ± 0.4
4	Payback period (year)	2.59 ± 0.8

Note: This analysis is done in yearly basis

Table 2. Net Income Received by Farmer in Selected Regions

No	Location	Amount (Rp/month)			Average
		Scale-1	Scale-2	Scale-3	
1	Bogor	432.919	719.918	1.188.619	780.485±381.473
2	Boyolali	- 47.519	1.521.820	- 92.780	460.507±919.403
3	Pasuruan	510.872	- 180.354	1.129.262	486.593±655.145