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A Study on Dairy Farming of Daerah Istimewa Yogyakarta Province, Indonesia

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Introduction

Dairy farming was first introduced in Indonesia on the island of Java by the Dutch to fulfil their need for milk and milk products, especially cheese. Indonesia had 81,000 farmers engaged in dairy farming rearing about 325,000 dairy cattle in 1999 that produced 379 million litres of fluid milk. Milk consumption in Indonesia is very low. According to the Union of Indonesia Dairy Cooperatives, in 1999 per capita daily milk consumption was 128.5 grams. This compares much unfavourably with the per capita daily milk consumption of 714 grams in Switzerland, 637 grams in New Zealand, 623 grams in United States and 509 grams in United Kingdom. The per capita milk consumption is far short of the 210 grams per head per day minimum requirement recommended by the Nutritional Advisory Committee. Based on these conditions, it can be said the dairy farming in Indonesia has good potentiality.

Dairy farming in Indonesia is far from satisfactory. People engaged in dairy farming are mainly smallholding farmers who have various limitations in dairy management, marketing of milk and economic efficiency. Productivity is still low when compared with the USA, Canada, New Zealand and Japan. Dairy cattle and semen with good records have been imported. However, the full genetic potential has never been achieved because of poor management and lack of good quality roughage. The low productivity and high cost give lower financial returns to the farmers. Farmers have two choices in milk marketing. They can sell their milk to cooperatives or directly to consumers.

Objectives and Research Method

This research was focused on: 1) understanding of dairy farming and analysis of labour use according to the various activities of dairy farming and the nature of its management, 2) milk marketing strategy undertaken by the farmers, and 3) profitability of dairy farming. Field survey was done in Daerah Istimewa Yogyakarta Province for the study that represents different regencies; Sleman Regency (mountain area), Bantul Regency (coastal and sub-urban area) and Yogyakarta Municipality. Data were collected through interviews with the farmers through a structured questionnaire and on site observation and participatory appraisal. The samples taken were 30 per cent of the dairy farmers in Bantul Regency and Yogyakarta Municipality, and 10 per cent in Sleman Regency where there are more 1,000 dairy farmers.

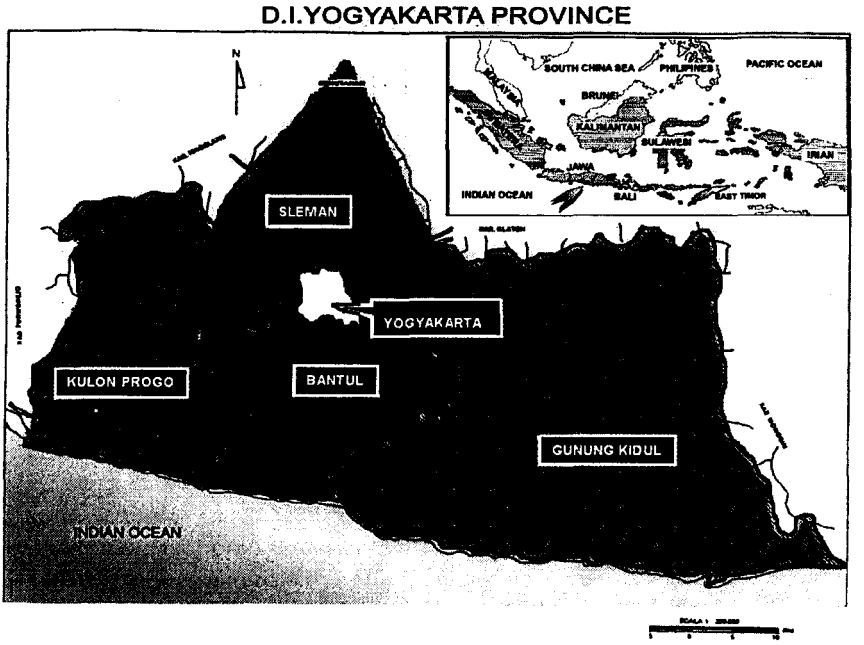

Figure 32.1: Map of Daerah Istimewa Yogyakarta Province

Dairy Farming in Indonesia

Dairy farming was first introduced in Indonesia on the island of Java during the Dutch colonial era, when small herds of Holstein-Friesian cows were kept close to the cities of Jakarta and Surabaya and in the highlands where the climate suited this temperate breed. After independence, the herds were broken up and smallholder dairying emerged at certain pocket areas, basically rearing the Holsteins crossbreed cattle.

The need for promotion of dairying in Indonesia arises due to several considerations such as low per capita availability of milk, prevalence of large unemployment, achieving self-sufficiency in the production of milk and saving valuable foreign exchange. In the ultimate analysis the need for dairy development in Indonesia arises due to the following main reasons: 1) to supply adequate quantity of milk at domestic market, and 2) to provide viable subsidiary occupation to unemployed or underemployed rural poor so as to raise their income earning capacities.

Table 32.1 shows that in Indonesia, domestic milk production is not enough to fulfil the national consumption. Imported fresh milk is more than domestic milk production. According to the Union of Indonesia Dairy Cooperative, Indonesia imports milk mostly from Australia, Canada and New Zealand because the domestic milk production is not sufficient.

Table 32.1: Recent Trends in Dairy Farming, Milk Production and Consumption in Indonesia

Year	Number of dairy cows	Number of farmers	Domestic milk production (million litres)	National milk consumption (million litres)	Import (fresh milk) equivalence) (million litres)
1993	329,520	-	356.50	–774.9	475.33
1994	330,480	-	361.69	–862.1	602.82
1995	341,330	-	385.49	–986.7	931.59
1996	347,990	-	389.95	1,057.3	649.92
1997	334,470	84,589	321.40	1,161.8	702.34
1998	343,500	79,717	360.14	–962.9	539.84
1999	334,000	83,091	378.86	–966.7	509.51

Source: Indonesia Central Bureau of Statistics (1999) and Union of Indonesia Dairy Cooperatives (2000).

Dairy Farming in Daerah Istimewa Yogyakarta Province

Daerah Istimewa Yogyakarta Province is one of the 31 provinces of Indonesia. It consists of five regions. Out of them Sleman, Bantul and Yogyakarta were chosen for the study purpose. Sleman is an inland mountain region, Bantul, coastal region and Yogyakarta, urban region. According to the Meteorology Station of Adisucipto, the average temperature in Daerah Istimewa Yogyakarta Province during 1999 was 26.1°C, the maximum temperature was 33.1°C and the minimum temperature was 21.6° C. The humidity was recorded between 22 per cent - 98 per cent; air pressure was between 1,003.8 - 1,014 hecto pasca.

Etgen and Reaves (1987) state that "dairy cows performance can be adversely affected by climatological factors, especially by extremes in temperature and excessive humidity at high temperatures. Fortunately, cows adapt well to a wide range of temperature. Although the ideal environment appears to be 30° - 60°F (-1° to 15°C), little adverse effect on production is noted within a range 5°- 80°F (-15° to +27°C). Breed differences in heat tolerance have been reported, with Holsteins having the lowest (80.6°F or 27°C) and Jerseys the highest (86°F or 30°C) in critical temperature". The Holsteins and Jerseys could tolerate the average temperature in Daerah Istimewa Yogyakarta Province.

Dairy Cattle Holding by Farmers

Dairy cows composition is based on the age of cows, calves, young and adult. Lactation cows, dry cows and bulls are categorized as adult. Although Jerseys could better tolerate the average, temperature in Daerah Istimewa Yogyakarta Province and the Animal Husbandry Service has been promoting the Jerseys since 2000, the farmers prefer to rear Holstein crossbreed as they are more used to rearing this breed. There are only four Jerseys owned by two farmers in Sleman.

Table 32.2 presents the average dairy cows holding by the farmers in all three regions. They are 3.6 in Sleman, 6.3 in Bantul and 6.5 in Yogyakarta and are composed of lactating cows,

Table 32.2: Composition and Number of Dairy Cows Holding per Household in the Study Regions

Description	Sleman	Bantul	Yogyakarta
Average dairy cows holding (head)	3.6	6.3	6.5
Lactating	1.4 (38.9)	3.4(54.0)	4.9(75.4)
Dry	0.5(13.9)	1.2(19.0)	0.8(12.3)
Heifer	0.6(16.7)	1.0(15.9)	-
Calves	1.1(30.5)	0.7(11.1)	0.8(12.3)
Lactating: dry ratio	74:26	74:26	86:14
Milk production/head/year (litres)	2,005.9	2,308.3	2,068.4
Lactation period (days)	289.9	292.9	295.0
First calving age (months)	28.6	27.8	28.0
Calving number (time)	4.5	5.5	4.6
Calving interval (months)	17.2	15.2	16.2

Source: Filed Survey, 2001.
Note: Figures in parentheses are for each of the dairy cows' composition.

currently dry cows, heifer that would be lactating in 2-12 months, and calves that would be lactating after 24 months with normal rearing.

The ratio of lactating cows and currently dry cows is 74:26 in Sleman and Bantul and 86:14 in Yogyakarta. The farmers in Yogyakarta try to increase the ratio of lactating cows in its herds as a management strategy by replacing the dry cows and heifers with lactating cows.

Milk production per head per year is 2,308.3 litres in Bantul, which is the highest, 2,068.4 litres in Yogyakarta, and 2,005.9 litres in Sleman, which is the lowest. Milk production is closely related to the lactation period. The average lactation period is 289.9 days in Sleman, 292.9 days in Bantul and 295.0 days in Yogyakarta which is not much different among the three regions. The ideal lactation period for the regions is 305 days (Kusumadewa *et al.*, 1988) and the recommended length of the dry period is 45 to 60 days (Etgen and Reaves, 1987). Hence, there is room to improve the lactation period and increase milk production in all three regions.

According to Shukla and Brahmankar (1999), an efficient system of milk production depends largely on three factors; the productivity of an animal (genetics), the level of feed nutrients and its maintenance. Efficient dairy cows are the result of inheritance and improved breeding. The dairy cooperative aids farmers in this aspect by supplying proper semen for artificial insemination. Thus, the most important aspect of dairy farm management for increasing milk production is the quantity and quality of feed provided to animals. The animal feed is divided into concentrate and fodder and their balanced ratio is very important to sustain and or increase the production (of milk) and reproduction ability of cows. Since fodder quality, composed of green grass and dry roughages, is variably poor, dairy cows are unable to produce milk unless they are fed with concentrate in addition to fodder. The feeding practices

Table 32.3: Feeding Practices in the Study Regions

Regions	Frequency of Feeding per Day			Type of Feeding	
	Once	Twice	Thrice	Individual	Group
Sleman	9 (9.1)	12(12.1)	78(78.8)	11(11.1)	88(88.9)
Bantul	-	1(14.3)	6(85.7)	3(42.9)	4(57.1)
Yogyakarta	-	-	8(100)	7(87.5)	1(12.5)

Source: Field Survey, 2001 ·

Note: Once; fodder and concentrate are fed in the morning. Twice; fodder is fed in the morning and concentrate in the afternoon. Thrice; fodder is fed twice in the morning and afternoon, and concentrate is fed after morning milking.

that are followed in three regions are summarised in Table 32.3. All the farmers stall feed the dairy cows twice or thrice a day, generally, feeding fodder and concentrate separately. But in Sleman, some (9.1 per cent) farmers feed their dairy cows only once a day in the morning, giving fodder and concentrate together. Farmers in Sleman mostly feed their animals in groups, whereas in Yogyakarta most practise the individual type of feeding. In Bantul, both methods are practised in almost the same ratio. In terms of quantity, it is very difficult to calculate the amount of fodder given to an animal as they are fed in lump sum. The average daily concentrate given to lactating cow per head is 3 kg, 4,5 kg and 4 kg in Sleman, Bantul, and Yogyakarta, respectively. Currently, dry cows are not fed concentrate in Sleman. In Bantul and Yogyakarta, dry cows are currently fed concentrate half the amount of lactating cow's allocation. Farmers purchase concentrate from the cooperative, often on credit, paid later by the sale of milk. Farmers also take loans from the cooperative for the purchase of animals and necessary equipment, and construction of animal stalls. They also take the animal insurance from the cooperative.

The first calving age is 28.6 months in Sleman, 27.8 months in Bantul and 28.0 months in Yogyakarta which is not much different among the three regions. But the calving number is nearly the same in Sleman and Yogyakarta; being 4.5 and 4.6, respectively. But it is higher (5.5) in Bantul. The calving interval is 17.2 months in Sleman, the longest; 15.8 months in Bantul, the shortest; and 16.5 months in Yogyakarta, in between them (Table 32.2). Both of these reproduction qualities are related to milk production affecting the milk production adversely if the first calving age and calving intervals are high and long. In addition to the breed of the cow and feed quality, heat detection also plays a vital role in improving these reproduction abilities of the animal. Hence, the ability to properly detect the heat and inseminate the animals at the proper time is very important to improve the reproduction quality of the animal and consequently to increase the milk production. The insemination technology and facilities play an important role in this matter. The cooperative also provides necessary veterinary and extension services to the farmers in this aspect.

There are no farmers who raise seed bull in all three regions due to the provision of artificial insemination by the cooperative and Animal Husbandry Service. The service per conception of artificial insemination is 3.8, which means the number of artificial insemination required

to obtain a pregnancy is almost four times. The non necessity of raising a seed bull allows the farmers to raise more cows, consequently producing more milk. Whenever a male calf is born, farmers sell it to the cooperative to pay their credit.

Labour Use in Dairy Activities

The farmers and dairy cattle are the two most important factors in determining the degree of profitability and personal satisfaction derived from dairy farming. The farmers are responsible for doing many things, including a number of little things needed to be done in dairy farming. Doing these things well and when they need to be done can make dairy farming a profitable job and an interesting and challenging way of life. Neglecting them can make the dairy farming a failure or return little profit.

Labour is one of the important inputs in dairy enterprise. The knowledge of dairy cow management and the requisite skills needed in dairy farming determine the quality of labour and quantity of input to enhance the productivity of dairy cows.

In Indonesia, like in the study region, dairy farming is mostly undertaken by small farmers rearing a few cows. For them, dairy farming is one of the components of farming. They basically use family labour, both male and female, to perform the dairy farming activities from cleaning the animal house and animal, milking, watering, delivering milk to cutting fodder and work related to cooperative facilities usage. When they have to hire labour for such activities they hire local people, all male.

Table 32.4 shows the data on man day's labour use for various dairy farming activities in the three study regions. The highest labour use per cow is in Bantul (129 man days) followed by Yogyakarta (122.5 man days) and Sleman (115.6 man days).

Table 32.4: Dairy Farming Labour Use per Household per Annum in the Study Regions

Dairy farming activities	Sleman		Bantul		Yogyakarta	
	Female	Male	Female	Male	Female	Male
Cleaning animal house	12.4	45.6	35.7	57.3	-	90.8
Cleaning cows	45.6	4.8	93.2	3.5	-	84.6
Milking	34.2	2.6	78.6	6.7	-	103.2
Feeding	35.2	33.8	72.4	65.8	-	126.1
Watering	29.0	12.1	67.6	10.8	-	93.2
Delivering milk	22.8	1.4	94.3	81.8	-	215.5
Cutting fodder	34.2	92.8	-	136.9	-	-
Others	1.2	1.7	1.6	5.2	-	4.8
Sub total	214.6	194.8	443.4	368.0	-	718.2
Total	409.4	811.4	718.2			
Man-day labour use/ cow	60.6	55.0	70.5	58.5	-	122.5

Source: Field Survey, 2001.
Note: One man day is 8 hours. 'Others' include, going to cooperative office for artificial insemination, concentrate and credit.

Table 32.5: Family Labour and Hired Labour Use Per Cow Per Household in the Study Regions

Regions	Man day family labour			Man day hired labour (male)	Total
	Female	Male	Total		
Sleman	60.6(52.4)	51.1(44.2)	117.7(96.6)	3.9(3.4)	115.6(100)
Bantul	70.5(54.7)	12.3(9.5)	82.8(64.2)	46.2(35.8)	129.0(100)
Yogyakarta	-	6.7(5.5)	6.7(5.5)	115.8(94.5)	122.5(100)

Source: Field Survey, 2001 .
Note: Figures in parentheses are percentages.

Because of the nature of the dairy work like cleaning cows, milking, feeding, watering and delivering milk, there is a tendency for more female family members to perform them in Sleman and Bantul. More than half of the dairy farming activities are done by female family members in these two regions. In Yogyakarta, almost all the dairy farming activities are done by hired male labours and most of the family members, male and female, are engaged in other jobs such as clerical work, business and professional work. In Sleman, hired labour used in dairy farming activities is very low (3.4%), hired only during the peak period of harvesting and cultivating, whereas in Bantul it is rather high (35.8%). All such hired labours are males in both the regions (Table 32.5).

Thus, it can be observed that in the study regions, dairy farming use unused and underused female (family) labour and male (family and hired) labour to generate earning from dairy farming.

Milk Marketing

The availability of a good market to sell milk, which is highly perishable, is critical to the success of dairy farming. A good market may be defined as one where prices paid to dairy farmers are high enough to provide the opportunity for a reasonable level of profit and secure sufficient to provide assurance of a continuing outlet for the milk.

The dairy farmers in the study regions tend to sell their milk through the cooperative, although some also sell the fresh milk directly to consumers and local agents. The cooperative supplies the milk to the milk processing industry on a contract basis. The milk processing industry processes the milk and distributes it to the consumers as processed milk. The cooperative also distributes a part of the fresh milk to the local agent and consumers directly, and a part is fermented and distributed to the consumers directly (Figure 32.2).

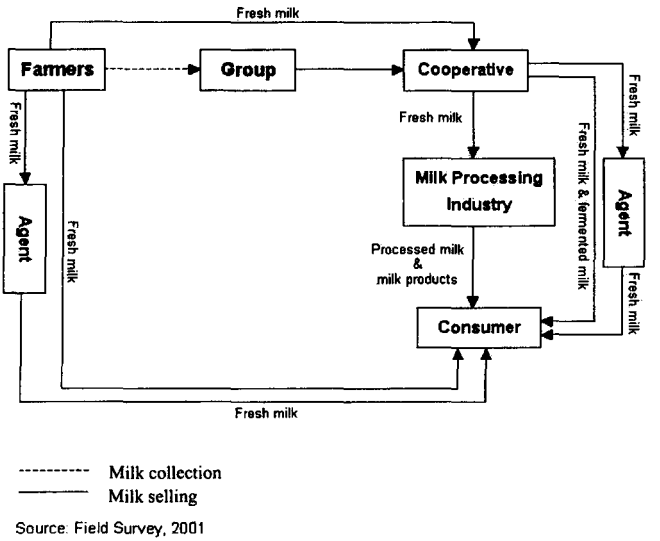

Figure 32.2: Milk Marketing in Daerah Istimewa Yogyakarta Province Indonesia

Table 32.6: Selling of Milk by the Farmers in the Study Regions

Regions	Selling of milk to			
	Cooperative		Outside cooperative	
	Morning	Afternoon	Morning	Afternoon
Sleman	99(100)	99(100)	-	-
Bantul	4(57.1)	7(100)	3(42.9)	-
Yogyakarta	-	8(100)	8(100)	-

Source: Field Survey, 2001.

Note: Figures inside parentheses are percentages for each number of farmers.

All the farmers in Sleman sell their milk to the cooperative. Being in a mountain hinterland region they have no other opportunities. Yogyakarta being the capital city of Daerah Istimewa Yogyakarta Province and Bantul being very close to Yogyakarta farmers have access to sell their milk outside the cooperative. All the farmers in Yogyakarta and nearly half of the farmers in Bantul sell their morning milk individually to local restaurants, hotels, hospitals and other consumers directly as they get a higher price than the cooperative price by selling it this way. But they sell all the milk produced in the afternoon to the cooperative and fulfil their duty to provide milk to the cooperative as a member.

The payment for milk by the cooperative is made to the farmers on the basis of the quality of milk instead of merely on quantity basis. It is expected that the milk should have a minimum stipulated standard of 3.3 per cent fat and 7.7 per cent Solid Non Fat (SNF) content. Such

milk is priced 1, 280 rupiahs per litre (1 US$ = 11,300 rupiahs in April 2001). This standard is maintained by a system of premium and a penalty of 14 rupiahs on increase and decrease of 0.1 per cent fat and/or SNF content, respectively.

The farmers in Bantul and Yogyakarta, selling the same milk outside the cooperative, regardless of the fat and SNF content, get 1,680 rupiahs per litre when sold to local agents and 1,850 rupiahs per litre when sold directly to the consumers. Thus, they get 400-570 rupiahs extra per litre for such sold milk. In fact, the cooperative also sells a part of the fresh milk collected from the farmers to the local agents and consumers directly at the same respective prices. The local agents in turn sell the milk to the consumers at almost the same price as that charged by the farmers and the cooperative.

The cooperative sells the fermented milk to the consumers at the price of 4,000 rupiahs per litre. However, the cooperative sells a large portion of the fresh milk collected from the farmers to the milk processing industry at the price of 1,538 rupiahs per litre. It gains 258 rupiahs per litre and this becomes one of its main income sources to run the cooperative. The processing industry produces homogenised milk and many other milk products; powder milk, yogurt, butter, cheese, etc out of this fresh milk. It sells the homogenised milk to the consumers in plastic bottles containing 250 ml at 1,350 rupiahs per bottle.

Profitability of Dairy Farming

The cost of dairy farming is divided into: variable cost and fixed cost. Variable cost includes: fodder, concentrate, veterinary service, labour, transportation, interest of credit, energy and others. Fixed cost includes: animal tax, land tax, animal insurance, depreciation of animal, depreciation of equipment, and depreciation of building. The overall cost of production is the summation of these two components.

Table 32.7 shows the details of cost and return of dairy farming in the study regions. The variable cost is over 90 per cent in all three regions, although the amount is only eight million rupiahs in Sleman, just one-third of the amount in Yogyakarta and Bantul, 26 and 24 million rupiahs, respectively. The highest amount of variable cost item is labour cost (46.3%) in Sleman, concentrate (32.3%) in Bantul, and fodder (33.4%) in Yogyakarta, reflecting the nature of the dairy farming in each area.

In Yogyakarta, fodder cost is highest because the farmers have to buy the fodder. In Sleman it is low as the farmers self produce the fodder and or collect it free of charge from the forest, roadsides and riverbanks. In Bantul, farmers both purchase and self produce the fodder. Thus, the amount of fodder cost shown in Table 7 is purchased value for Yogyakarta, production and collection cost in Sleman and a summation of both in Bantul.

Concentrate is another key component in the variable cost of milk production. Its share is the highest in Bantul (32.3%), followed by Yogyakarta (28.4%) and Sleman (24.2%), reflecting the herd size and feeding style. All the farmers buy the concentrate from the cooperative where the price is cheaper than the outside market and the door delivery is made by the cooperative, which ultimately reduces the transportation cost of the farmers.

Table 32.7: Average Cost and Return of Dairy Farming per Household in the Study Regions (1,000 Rupiahs)

Description	Sleman	Bantul	Yogyakarta
1. *Variable cost*			
Fodder	1,504.5(17.0)	6,970.6(26.8)	9,448.4(33.4)
Concentrate	2,137.2(24.2)	8,407.7(32.3)	8,020.0(28.4)
Veterinary cost	168.2 (1.9)	478.3(1.8)	517.2(1.8)
Labour cost	4,093.9(46.3)	8,114.0(31.2)	7,812.5(27.6)
Transportation	38.2(0.4)	162.1(0.6)	196.9(0.7)
Interest of credit	60.6(0.7)	79.2(0.3)	214.1(0.8)
Energy	16.7 (0.2)	45.6(0.2)	96.6(0.3)
Total	8,019.3(90.7)	24,257.5(93.2)	26,305.7(93.1)
2. *Fixed Cost*			
Animal tax	3.5(0.0)	6.3(0.0)	6.4(0.0)
Land tax	27.8(0.3)	69.0(0.3)	149.6(0.5)
Animal insurance	424.8(4.8)	754.8(2.9)	765.6(2.7)
Depreciation of animal	242.7(2.8)	610.7(2.4)	850.7(3.0)
Depreciation of equipment	54.5(0.6)	172.0(0.7)	95.6(0.3)
Depreciation of building	66.3(0.8)	154.4(0.6)	88.8(0.3)
Total	819.6(9.3)	1,767.2(6.8)	1,956.7(6.9)
Total production cost	8,839.0(100)	26,024.7(100)	28,262.4(100)
Selling cow	4,047.1	7,229.3	6,643.0
Selling calves	1,320.0	5,987.0	5,025.0
Selling milk*	4,774.0	15,720.6	19,307.7
Selling manure	613.6	1,511.1	1,567.1
Total gross income	10,754.7	30,448.0	32,542.8
Net income	1,915.8	4,423.3	4,280.4
Net return to farm	5,563.7	9,632.5	4710.1

Source: Field Survey, 2001.

Note: Rupiah is Indonesian currency (11,300 rupiahs = 1 US$).
Figures inside parentheses are percentages for each of the cost item.

* This includes bonus benefit obtained by the farmers for milk fat and SNF contains.

Share of labour cost for various dairy farming activities is also very high. Its share in the variable cost is 46.3 per cent in Sleman, 31.2 per cent in Bantul and 27.6 per cent in Yogyakarta. Labour cost includes the actual wage paid to the hired labour and evaluation of the self labour, each separately for female and male, according to market price. The share of self-supplied labour in this cost is 96.6 per cent in Sleman, 64.2 per cent in Bantul and only 5.5 per cent in Yogyakarta. Other variable costs, including veterinary services, transportation, interest of credit, energy, are nominal in all the regions. The fixed cost is 9.3 per cent in

Sleman, 6.9 per cent in Yogyakarta and 6.8 per cent in Bantul and mainly consists of animal insurance, 4.8 per cent in Sleman, 2.9 per cent in Bantul and 2.7 per cent in Yogyakarta, and the depreciation of animal, 3.0 per cent in Yogyakarta, 2.8 per cent in Sleman and 2.4 per cent in Bantul. Other components of fixed cost are nominal.

The main source of income is milk in all three regions. The other sources are cows, calves, and manure. Farmers also receive a bonus on the basis of fat and SNF content of their milk from the cooperative. Although the amount of income from these sources varies according to the region, their order of ratio is almost same in all the regions. The income from the sale of manure is actual income from its sale in Bantul and Yogyakarta. But in Sleman, nearly half of the amount is the evaluated value of the manure used in the self farm.

The total amount of gross income sums up to 10.8 million rupiahs in Sleman, 30.4 million rupiahs in Bantul, and 32.5 million rupiahs in Yogyakarta. The subtraction of total production cost from the gross income gives the net income per household. Thus, the net income from dairy farming is 1.9 million rupiahs per household in Sleman and 4.4 million rupiahs and 4.3 million rupiahs in Bantul and Yogyakarta, respectively. This net income is the evaluated profit of the farmers from the dairy farming. The returns to farm, including the returns to self resources, like labour, is 5.6 million rupiahs in Sleman, 9.6 million rupiahs in Bantul and 4.7 million rupiahs in Yogyakarta. It can be observed that the returns for the farm increase by three times the net income in Sleman and nearly double in Bantul when the returns to their self resources are considered. This is the extra income gained by the farmers utilising their sources in dairy farming which otherwise would have been unused and or underused.

Conclusion

In Indonesia, dairy farming is mostly undertaken by small farmers rearing a small number of cows. Farmers basically use family labour, both male and female, to perform the dairy farming activities. Because the various dairy farming activities are usually centred in the homestead area, there is a tendency for more female family members to perform them. This is especially true for the mountain inland region, Sleman and the coastal region, Bantul. In Yogyakarta, an urban area, labour use in dairy is mostly hired male labour.

The milk marketing strategy undertaken by the farmers depends on the location. The farmers located near the capital city of the province have access to sell their milk outside of the cooperative and get a higher price. Farmers in Sleman sell all their milk to the cooperative, as they have no other choice due to its distance from the capital city and lack of proper transportation facilities.

In on-going dairy farming the cost of feed (fodder and concentrate) and labour forms the major portion of the production cost. Feed cost depends on the availability of fodder land; all the farmers in Yogyakarta have to buy fodder because they do not have fodder land. Consequently, their feed cost is higher than in the other regions of Sleman and Bantul. Labour cost in Yogyakarta is also higher, as they depend much on hired labour for dairy

activities. This cost is lower in Sleman where use of family labour is highest. The income from selling milk is much higher in Bantul and Yogyakarta, where they can sell a portion of their milk outside of the cooperative at a higher price. Farmers in these two regions also gain some income by selling manure, whereas farmers in Sleman mostly self use the manure in self farm. The net income from dairy farming per farm is about two million rupiahs in Sleman and the amount in more than two times in Bantul and Yogyakarta. When this net income is adjusted as net return to farm taking into consideration returns to self own resources such as labour, the amount increases in all three regions. It nearly doubles in Bantul. But the rise is highest by three times in Sleman. Thus, it can be concluded that the dairy farming, undertaken by small farmers can make better use of self own resources, especially self labour, which is otherwise unused and or underused, and gain extra income to the dairy farmers. This is more tangible for a mountain inland region like Sleman where there are very few other economically gainful opportunities available. Dairy farming is becoming a subsidiary occupation in such regions. Dairy farming also has been able to provide fresh milk to the consumers, directly or indirectly at cheaper prices and has been able to provide processed milk and other milk products through the cooperative and milk processing industry. It has been substantially contributing in supplying the milk for the domestic demand.

However, there is room for improving the breed of the cattle, production and reproduction abilities through dairy farm management and increasing the number of dairy pocket areas, dairy farmers and herd size per farmer, to increase milk production at individual, animal level, farm level and finally national level. That is the only way to increase the supply of milk domestically from its current one-third of the national demand. Government policies, especially extension and cooperative policies will play a big role in these regards and such far-sighted policies are awaited.

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