

MANAGEMENT OF MILK TRANSPORTATION: A STUDY CONDUCTED IN CENTRAL JAVA, INDONESIA

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ABSTRACT

Milk produced by small dairy farmers (member of dairy cooperatives) was affected by non- and technical factors. Technical factors were feeding, breeding and management, while non-technical factors possibly might be the institution or persons in charge, facilities, or equipment. Route of milk from milk producer to plant as follows: small dairy farmers → milk collecting point → cooling unit (owned by dairy cooperative) → milk plant. This study was conducted in 1997 by analyzing milk quality (in term of specific gravity, fat, solid non-fat/SNF, total solid/TS and bacterial counts). Milk samples were taken from 112 small dairy farmers. They were members of dairy cooperatives of Warga Mulya (WM), Kaliurang (KU), Pesat (PT), Puspetasari (PPT), Jatinom (JTN), and Cepogo (CPG). Results of milk quality were surprising because milk quality was taken directly from dairy farmers better compared to milk in the milk plant. This study concluded that there was tremendous decrease in milk quality particularly number of bacterial counts in milk after reaching the milk plant. Those decrease might be due to (1) lack of equipment or facilities that managed by milk collecting point (MCP) or dairy cooperatives (DC), (2) transportation duration or (3) lack of skilled man power who have to work quickly and professionally both in MCP or DC.

Key words : Milk quality, Milk bacterial counts, Small dairy farmers

INTRODUCTION

"PT Sari Husada" is the big one of milk plant in the Central Java receiving 40,000 to 50,000 liters of milk per day. The milk come from 6 (six) cooperatives. Those milk cooperative are Warga Mulya and Kaliurang, both in Yogyakarta, Pesat in Purwokerto Banyumas, Puspetasari and Jatinom both in Klaten and the last one is Cepogo in Boyolali.

Milk price received by the dairy farmers depended upon the milk quality tested in the milk plant. The components measured for milk price were fat, solid non fat (SNF) and bacterial counts. In general, milk fat accepted in the milk plant was in accordance with the standard ruled by the government, even more in certain places, whereas SNF of the milk was under the standard for all milk cooperatives, but bacterial counts in milk showed that 3(three) milk cooperatives (Warga Mulya, Pesat and

Jatinom) in good position and the other three milk cooperatives were under the standard. The milk standard used was based on the rules of the Direktorat General of Livestock 1983. The rules were:

1. Specific gravity of milk (minimum 1.028 (27,5 °C))
2. Milkfat (3 percent)
3. SNF of milk (7.9 percent)
4. Total Solids (TS) of milk (10.9 percent)
5. Methylen Blue Reductase Test (MBRT) (2 to 5 hours)
6. Bacterial Counts in Milk (maximum 3 millions/cc)

Many problems are being faced by the milk industry in Indonesia, because the domestic milk production only fulfilled about 30 percent of the national demand. It means that 70 percent of the milk demand are still imported.

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Those problems mentioned are:

1. Structure of business in milk production
2. Milk marketing
3. Agricultural business in dairy farming
4. Milk quality and milk production.

The objective of this study was trying to investigate the effect of milk transportation management on milk quality.

MATERIALS AND METHODS

Materials

One hundred twelve of dairy farmers were taken as samples in this study. They consisted of 26 dairy farmers of Warga Mulya cooperative, 25 farmers from Kaliurang, 9 farmers from Pesat cooperative, 12 farmers from Puspetasari, 20 dairy farmers from Jatinom and 20 farmers of Cepogo Boyolali.

Samples were taken in morning and afternoon time of milking and coming from 112 dairy farmers and were analyzed for milk quality. Milk quality measured was milk-fat, total solid of milk, bacterial count in milk and specific gravity of milk. Milk analysis were done at the laboratory of "PT Sari Husada" Yogyakarta.

Methods

Dairy farmers came from each milk cooperatives were chosen randomly. Milk samples taken from farmers were put directly in to the ice jar before analyzing in the

laboratory. Specific gravity of milk was measured by the lactodensimeter (Juergenson and Mortenson (1997), whereas the milk fat was analyzed by the method of Babcock. Total solids of milk were determined by the difference while bacterial counts in milk were counted by the method of plate count. All data were statistically analyzed by the arithmetic mean of Steele and Torie (1980).

RESULT AND DISCUSSION

Result of milk acceptance and milk rejection and also milk quality are summarized in table 1, 2 and 3 respectively, Whereas table 4 is showing milk test, table 5 is about time consumption. Based on table 1, milk rejection by the milk plant in 1997 was 3.23% (average of 6 cooperatives), The reasons of milk rejection were MBRT (less than 2 hours) and specific gravity of milk (less than 1.024). Table 2 indicated that the average of fat percentages in milk for all milk cooperatives was more than 3.30 %. It means that this quality is minimum requirement.

The requirement for milk quality was always adjusted based on the consensus between the milk plant and Indonesian union for milk cooperation (GKSI). The percentage of SNF in milk the average for 6 cooperatives has not yet fulfilled the minimum standard, while for TS in milk from 4 milk cooperatives (Wargamulya, Kaliurang, Jatinom and Cepogo) have met the minimum requirement (11.50%; 11.19%; 11.00% and

Table 1. Milk acceptance and milk rejection by Milk plant in 1997

Cooperatives	Milk Acceptance (Liter)	Milk Rejection		Persons of Rejection (%)				
		(Liter)	(%)	MBRT <2 Hrs	Spec Gr <1,024	Fat < 2.80	Chlor +	Carb +
Warga Mulya	1,412,149	39,400	2.71	2.71	0	0	0	0
Kaliurang	1,418,698	68,250	4.59	4.59	0	0	0	0
P e s a t	2,579,458	4,050	0.16	0.16	0	0	0	0
Puspetasari	252,253	0	0	0	0	0	0	0
Jatinom	4,189,632	287,630	6.42	6.25	0.17	0	0	0
Cepogo	6,067,864	131,500	3.12	1.84	0.28	0	0	0
Total / year	15,920,054	530,830	3.23	3.07	0.16	0	0	0
Total / Day	43,617	1,454	3.23	3.07	0,16	0	0	0

Table 2. Milk acceptance for quality

Cooperatives	Fat (%)	SNF(%)	TS (%)	Bacterial count (Millio/ cc)	Range of Bact Count (Million / cc)
Warga Mulya	3.81	7.68	11.50	2.66	1.99 - 3.67
Kaliurang	3.61	7.58	11.19	3.54	1.96 - 5.60
P e s a t	3.43	7.59	10.98	2.40	1.40 - 4.35
Puspetasari	3.48	7.50	10.98	3.19	2.18 - 4,47
Jatinom	3.43	7.57	11.00	4.90	4.12 - 6.34
Cepogo	3.59	7.61	11.21	6.39	5.13 - 8.74
Average	3.54	7.59	11.13	4.62	-

Table 3. The average of milk quality at dairy farmers level and at the milk plant in 1997

Milking time	No. of samples (Dairy farmers)	Specific grafity (T 27,5°C)	FAT (%)	SNF (%)	TS (%)	Bact count (Million / cc)
Warga Mulya Cooperative, Yogyakarta						
Morning(AM)	26	1.0273	4.39	8.56	12.85	0.18
Afternoon(PM)	26	1.0267	5.16	8.58	13.72	0.21
Average (AV)	-	1.0270	4.73	8.57	13.29	0.20
Milk Plant(MP)	-	1.0258	3.81	7.68	11.50	2.66
Kaliurang Cooperative Yogyakarta						
Morning (AM)	25	1.0274	4.01	8.43	12.42	0.35
Afternoon(PM)	25	1.0272	4.79	8.48	13.23	0.45
Average (AV)	-	1.0273	3.61	8.46	12.83	0,40
Milk Plant(MP)	-	1.0258	3.61	7.58	11.59	3.54
P e s a t cooperative, Banyumas						
Morning(AM)	9	1.0276	4.47	8.26	12.75	1.20
Afternoon(PM)	9	1.0279	5.01	8.44	13.44	0.56
Average (AV)	-	1.0273	4.79	8.35	13.10	0,68
Milk Plant (MP)	-	1.0256	3.43	7.55	10.98	2.40
Puspetasari cooperative, Klaten						
Morning (AM)	12	1.0272	3.96	8.71	12.67	0.29
Afternoon(PM)	12	1.0262	5.02	8.55	13.58	0.16
Average (AV)	-	1.0267	4.49	8.63	13.13	0,23
Milk Plant (MP)	-	1.0254	3.48	7.68	11.50	2.66
Jatinom Cooperative, Klaten						
Morning(AM)	20	1.0274	3.78	8.44	12.20	0.36
Afternoon(PM)	20	1.0266	4.74	8.66	13.37	0.52
Average (AV)	-	1.0269	4.26	8.55	12.79	0,44
Milk Plant (MP)	-	1.0257	3.43	7.57	11.20	4.90
Cepogo Cooperative, Boyolali						
Morning(AM)	20	1.0273	4.42	8.52	12.92	0.50
Afternoon(PM)	20	1.0265	4.31	8.32	13.64	0.61
Average (AV)	-	1.0269	4.37	8.42	12.78	0,56
Milk Plant (MP)	-	1.0257	3.59	7.61	11.21	6.59

Table 4. Milk tests at The Milk collecting centers (MCC) and at the cooling unit owned by cooperatives (CU)

Milk Cooperatives	TESTS							
	Specific Gravity	Alcohol	Taste	FAT	Protein	Total Solid	MBRT	Bacterial Counts
1. Warga Mulya	Yes	Yes	Yes	Yes	No	Yes	No	No
MCC	No	No	No	No	No	No	No	No
2. Kaliurang	Yes	Yes	Yes	Yes	No	Yes	No	No
MCC	No	No	No	No	No	No	No	No
3. P e s a t	Yes	Yes	Yes	Yes	No	Yes	No	No
MCC	Yes	Yes	Yes	Yes	No	No	No	No
4. Puspetasari	Yes	Yes	Yes	Yes	No	Yes	No	No
MCC	No	No	No	No	No	No	No	No
5. Jatinom	Yes	Yes	Yes	Yes	No	Yes	No	No
MCC	No	No	No	No	No	No	No	No
6. Cepogo	Yes	Yes	Yes	Yes	No	Yes	No	No
MCC	No	No	No	No	No	No	No	No

11.21%, respectively). The other two cooperatives (Pesat and Puspetasari) were just beneath the standard. For bacterial counts in milk, the average of percentages was 4.62 millions per cc with ranging from 2.40 (Pesat) to 6.39 millions per cc (Cepogo).

From table 2 as well it could be seen that by improved milk-fat, TS and bacterial counts in milk (Soetarno, *et al*, 1998). The SNF in milk has not yet met the standard, because of concentrate feed given to the dairy cows was (1) under the requirement, (2) poor quality, (3) discontinued and limited stock. Those conditions occurred due to factors of dairy farmers social-economic and capability of each milk cooperatives in preparing concentrate feeds, or may be because of "fake milk".

Table 3 showed the milk quality at dairy farmers' levels was compared to the

milk quality at the milk plant level. From that table indicated that the averages of milk quality at the dairy farmers' levels was better compared to the milk plant. Those results could be explained with some reasons: (1) longer milk handling; (2) uncleanness of milk equipment; (3) milk tests did not work well in the MCC (see table 4) and (4) distance (farmers to MCC to CU to MP).

Particularly for distance problem, in the table 5 indicated that 4 out of 6 cooperatives showed the milk needed time more than 2 hours to reach the milk plant. Cooperatives of Warga Mulya and Kaliurang were just about 2 hours the milk running from the farmers to the milk plant, while Jatinom, Puspetasari and Cepogo needed time 135 minutes, 150 minutes and 195 minutes, respectively. Pesat cooperative was longest one in time required (more than 5 hours). It

Table 5. Time consumption of milk from producers to milk plant

Milk Cooperatives	Farmer to MCC (Minutes)	MCC to CU (Minutes)	CU to MP (Minutes)	Total Time (Minutes)
1. Warga Mulya	30	60	30	120
2. Kaliurang	30	60	30	120
3. P e s a t	30	90	180	300
4. Puspetasari	60	45	45	150
5. Jatinom	30	45	60	135
6. Cepogo	45	60	90	195

should be noted that in order to keep milk quality in the stable condition, it was suggested that the milk coming to the milk plant not more than 2 hours after milking (Anonimous, 1979).

CONCLUSION

Milk transportation managed by milk cooperatives in central Java should concern to their vehicles including milk tank and also cleanliness of milk equipment otherwise the milk accepted by the milk plant will be getting worse and worse. Besides that the rule and order have to be forced to everybody who is reluctant to be honest and discipline in milk production.

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