

มหาวิทยาลัยเชียงใหม่  
Chiang Mai University

**APPENDIXES**

## APPENDIX A

### Questionnaire for farm

Date.....

#### General Information

1. Farm ID \_\_\_\_\_ MCC \_\_\_\_\_ COOP \_\_\_\_\_
2. Owner \_\_\_\_\_ age \_\_\_\_\_
3. Number of milkers \_\_\_\_\_ Man \_\_\_\_\_ Woman \_\_\_\_\_
4. Number of years in dairy farming \_\_\_\_\_ years \_\_\_\_\_ months
5. Have the farmer ever had a dairy farming education?
  - No
  - Yes from \_\_\_\_\_
6. Income
  - Average daily milk production \_\_\_\_\_ kg      milk price/ kg \_\_\_\_\_ baht
  - (Average monthly income \_\_\_\_\_ baht)

#### Barns and Environment

7. Barns typing       Yes       No
8. Barn's environment
  - 8.1 Ventilation       Good       Fair       Poor
  - 8.2 Floor       Dry       Wet
  - 8.3 Milking area       found the feces       not found the feces
  - 8.4 Manure management       Good       Poor

**Milking hygiene**

9. Milking cow's cleanliness  Good  Fair  Poor
10. Cow washing  Yes  No (if "No" skip to 12)
11. Dry the cow  > 15 minute  < 15 minute
12. Udder preparation
- 12.1 clean the udder with disinfectant solution  Yes  No
- 12.2 type of disinfectant  Chlorine  Others \_\_\_\_\_
- 12.3 dry the udder before attach the teat cup  Yes  No
- 12.4 use individual towel per cow  Yes  No
- 12.5 milk stripping  Yes  No
- 12.6 CMT checking  Yes  No
- 12.7 pre dipping  Yes  No
- 12.8 attach the teat cup with in 1 min.  Yes  No
- 12.9 post dipping  Yes  No
- 12.10 teat dipping solution \_\_\_\_\_
- 12.11 dip the teat cup in disinfectant solution before next milking cow  
 Yes  No
- 12.12 milk filter  Yes  No
13. Started milking time morning \_\_\_\_\_ a.m. afternoon \_\_\_\_\_ a.m.  
Finished milking time morning \_\_\_\_\_ a.m. afternoon \_\_\_\_\_ p.m.
14. Milk transportation  by themselves  by the others

15. Started transportation time morning \_\_\_\_\_ a.m. afternoon \_\_\_\_\_ p.m.

Finished transportation time morning \_\_\_\_\_ a.m. afternoon \_\_\_\_\_ p.m.

### Milkers

16. Hands washing before milking  Yes  No (if "No" skip to 18)

17. Washing hands by  water  soap

### Equipment

18. Milking technique  hand milking  machine milking

(if "hand milking" skip to 19.5)

19. Milking machine

19.1 age of milking machine \_\_\_\_\_ years

19.2 age of teat cup liner \_\_\_\_\_ months

19.3 cleanliness of teat cup liner  Good  Poor

19.4 cleanliness of long milk tube  Good  Poor

19.5 cleanliness of bucket  Good  Poor

19.6 cleanliness of milk tank  Good  Poor

### Mastitis

20. Mastitis in the farm

20.1 number of milking cows \_\_\_\_\_

20.2 number of milking cows without mastitis \_\_\_\_\_

20.2 number of milking cows with 1-time mastitis \_\_\_\_\_

20.3 number of milking cows with more than 1-time mastitis \_\_\_\_\_

21. If the cow was sick, \_\_\_\_\_

- treat the cow by the farmer
- treat the cow by the volunteer veterinary technician of DLD
- treat the cow or consult with by the veterinarian
- others \_\_\_\_\_

22. Have the farmer's milk ever been rejected?

- No.
- Yes, because of the high bacterial number.
- Yes, because of the high somatic cell count.
- Yes, because of the antibiotic residue.
- Yes, because \_\_\_\_\_



- Barn score
  Total solid
- Somatic cell count
  Others \_\_\_\_\_
9. Does the MCC have clean water for cleaning the farmer's milk tank?
- Yes
  No
10. Number of Cooling Tank \_\_\_\_\_ Size \_\_\_\_\_
11. Temperature setting of Cooling Tank \_\_\_\_\_ °C
12. Temperature of cooling tank at collecting time \_\_\_\_\_ °C
13. Does the MCC clean the pipeline and cooling tank by CIP system?
- Yes
  No
14. Solutions which are used to clean the pipeline and cooling tank \_\_\_\_\_
- cleaned water \_\_\_\_\_ min \_\_\_\_\_ times
- basic solution \_\_\_\_\_ min \_\_\_\_\_ times
- acidic solution \_\_\_\_\_ min \_\_\_\_\_ times
- others \_\_\_\_\_
15. How often does MCC clean the pipeline and cooling tank?
- 1/day
  2/day
 Others \_\_\_\_\_
16. Have the milk of MCC ever been rejected?
- No
- Yes, because of high bacterial contamination.
- Yes, because of antibiotic residues.
- Yes, because of \_\_\_\_\_
17. Milk delivery to the dairy plants \_\_\_\_\_ times/day at \_\_\_\_\_ a.m./p.m.
18. Cooling system of cooling tank \_\_\_\_\_

19. Temperature of the milk will get to the set point in \_\_\_\_\_ hours

20. Milk collecting area's ground  wet  dry

21. Other details of MCC.

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## APPENDIX C

**The correlation of the microbiological quality between  
the indirect method of (MB) and the direct method (SPC, CC, LPC)**

		MB	SPC	CC	LPC
MB	Pearson Correlation	1.000	-0.657	-0.570	-0.227
	Sig. (2-taile)	.	<0.0001	<0.0001	0.0003
	N	264	262	263	251
SPC	Pearson Correlation	-0.657	1.000	0.656	0.357
	Sig. (2-taile)	<0.0001	.	<0.0001	<0.0001
	N	262	262	262	250
CC	Pearson Correlation	-0.570	0.656	1.000	0.240
	Sig. (2-taile)	<0.0001	<0.0001	.	0.0001
	N	263	262	263	250
LPC	Pearson Correlation	-0.227	0.357	0.240	1.000
	Sig. (2-taile)	0.0003	<0.0001	0.0001	.
	N	251	250	250	251

## APPENDIX D

**Microbiological quality (SPC, CC, LPC) of bulk milk from monthly samples  
of 11 milk collecting centers**

MCC	SPC (mean $\pm$ SE cfu/ml)	CC (mean $\pm$ SE cfu/ml)	LPC (mean $\pm$ SE cfu/ml)
1	4,064,433 $\pm$ 1.19 (N=25)	41,976 $\pm$ 1.37 (N=25)	7,311 $\pm$ 1.24 (N=25)
2	2,032,357 $\pm$ 1.11 (N=26)	19,409 $\pm$ 1.18 (N=26)	62,373 $\pm$ 1.21 (N=26)
3	1,541,700 $\pm$ 1.12 (N=24)	17,620 $\pm$ 1.21 (N=24)	6,577 $\pm$ 1.52 (N=24)
4	506,991 $\pm$ 1.12 (N=24)	6,998 $\pm$ 1.12 (N=25)	9,246 $\pm$ 1.31 (N=23)
5	1,798,871 $\pm$ 1.22 (N=23)	25,942 $\pm$ 1.31 (N=23)	11,641 $\pm$ 1.44 (N=21)
6	1,745,822 $\pm$ 1.22 (N=24)	28,840 $\pm$ 1.22 (N=24)	3,420 $\pm$ 1.23 (N=23)
7	1,230,269 $\pm$ 1.13 (N=23)	15,631 $\pm$ 1.17 (N=23)	2,234 $\pm$ 1.37 (N=23)
8	1,892,344 $\pm$ 1.26 (N=22)	19,275 $\pm$ 1.71 (N=22)	39,537 $\pm$ 1.18 (N=21)
9	668,344 $\pm$ 1.14 (N=23)	17,701 $\pm$ 1.16 (N=23)	2,208 $\pm$ 1.34 (N=21)
10	2,978,516 $\pm$ 1.15 (N=24)	51,642 $\pm$ 1.21 (N=24)	37,932 $\pm$ 1.30 (N=23)
11	405,509 $\pm$ 1.19 (N=24)	5,457 $\pm$ 1.33 (N=24)	1,300 $\pm$ 1.22 (N=23)

**VITA**

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2001, Doctor of Veterinary Medicine (second class honor) from Chulalongkorn University, Bangkok, Thailand

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