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The Effect of Improving Sanitation Prior to Milking on Milk Quality of Dairy Cow in Farmer Group

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ABSTRACT

The purpose of the study was to investigate the effect of environmental and pre-milking sanitation on milk quality of dairy cow in the farmers. Milk quality were measured from samples that were taken from cows managed by farmers in Pakem, Sleman during the existing condition and implementation of treatment. Twenty three dairy cows were used to observed the effect of treatment, namely improve environmental sanitation and pre-milking. The treatment consisted of cleaning the floor stable, water and feed trough, washing the cow and udder, drying udder and discarded the first milk flow. The results showed that improving sanitation significantly decreased milk acidity from 0.19% to 0.14% and number of bacteria in milk. The treatments could also increase milk density and solid non fat. The study concluded that improving environmental sanitation and pre-milking gave significant effect to milk quality.

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INTRODUCTION

Smallholder dairy farm plays an important role in Indonesia's milk production. Until the recent years most of dairy cow in farmer groups were managed traditionally, e.g. milking by hand, poor of milk preservation. In recent situation, where milk consumption grew fastly, farmers have opportunity to sell milk directly to consumers. This way might alter marketing mechanism and reduced farmers dependency on dairy co-operative. However, to undertake

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direct selling farmers have to achieve requirement of milk quality, such as to pass Indonesian National Standard e.g. negative alcohol test, low in total plate count and acidity [5]. Good milk quality could be attained by sufficient feed, good environmental sanitation and milking procedure. Cleaning udder and teat was important to keep milk hygiene. To assure milk quality [4] suggested to scrub teats and teat ends thoroughly with a paper towel or direct a stream of sanitizing solution on the teats and wash by hand. According to Barbude [1], very good quality milk have no coliform in milk and the reduction time if methylene blue reduction test (MBRT) would be longer than 5 hours. To reduce odor and contamination there was need to give attention on manure disposal because in smallholder manure handling was commonly poor.

The objective of this study was to investigate the effects of improving sanitation prior to milking on the quality of milk produced by smallholder. Sanitation was focused on the cleanliness of floor in the stable, water and feed trough, and pre-milking preparation (cleaning and drying udder, discard first milk flow). The study expected to find good milk quality as a result of improving sanitation and pre-milking preparation which were conducted by small dairy farms in the village.

MATERIALS AND METHODS

The site of study was village of Turgo, Purwobinangun, Pakem, Sleman, Yogyakarta. Milk quality was analysed in the Laboratory of Food and Animal Product, Faculty of Animal Science, Universitas Gadjah Mada. Materials of study consisted of lactating dairy cows, questionnaires, milking and storage equipments, feed and milk samples. Data were collected for 4 months by observation and interviewing farmers. The data consisted of the farm characteristics, daily practices in keeping dairy cows and milk quality during the existing condition and treatment.

In this study treatment was conducted by (i) delivering information about the important of sanitation pre-milking to increase milk quality, (ii) showing an example of clean and hygienic cow house, proper milking process and manure handling, (iii) implementation of good sanitation by cleaning floor of stable, water and feed trough, washing the cow and proper pre-milking (cleaning and drying udder, discarded first milk flow) and filtering post harvest milk. Sample was taken from the cow in the existing condition and during treatment with 3 replications. Milk was collected aseptically in bottle for analysis of composition, included milk density (was measured using lactodensimeter), milk fat (following babcock test), total solid,

solid non fat. Determination of milk quality consisted of alcohol test (using 70% alcohol), pH (was measured using pHmeter), acidity (lactic acid equivalent), and methylene blue reductase test (MBRT). According to [1]. The number of bacteria was predicted with reductation time of MBRT, which the longer time of reductation showed the less number of bacteria in milk. The equivalent number of bacteria in milk with reductation time longer than 5 hours was less than 2 million. Data were statistically analysed using T-test to compare the quality of milk during the existing condition and after treatment.

RESULTS AND DISCUSSION

The condition of dairy farms

The results of interview showed that smallholder dairy farms in the village of Turgo were situated on the altitude ± 1.000 above sea level. Water is available all the year from the mountain spring. This situation indicated that farmers have enough supply of water for drinking and sanitation of cows. The farmer group has 23 members. Herd size varied from only 1 to 16 cows/farmer. Dairy cows were fed grass and concentrates, with average of 40 and 2 kg/head/d, respectively. The average milk production of cow in this study was low 3.4 liter/cow/d and was sold to dairy co-operative. The reproductive performance of cows in the group indicated low fertility showed by service/conception of 6 to 8. This data indicated high cost of reproductive maintenance (6-8 insemination/pregnancy). In this study majority of feed for dairy cow consisted of forages. Only small amount of concentrates was given to the cow, therefore milk production was low. Similar study in smallholder reported that milk yield from exotic cows were below the potential breed. The average of Friesian cows was found to be 2.015 liter/lactation and calving interval reached 530 days [3]. In this study, low milk production and price caused small income for farmers in the groups and consequently less capability to improve their practical dairying, e.g. not able to buy extra concentrates or sanitary equipment.

Practical dairy farming

In this study, milking cow was done by hand every morning in the stable. During the existing condition the practical milking was counted to be poor because previous to milking farmers did not clean the floor and feed trough. Washing hands was conducted at the same time they cleaned udder. There was no drying udder after washed and first milk flow was discarded. This practical milking preparation caused undetectable of milk abnormality. There were 5 of 23

farmers who processed dairy cow manure by drying or making compost but the other only disposed it close to the cow house. This condition caused contamination and odor, which easily absorbed in milk.

Different practices were applied during the implementation of treatment (Table 1). Practical milking has been improved by cleaning the floor, water and feed trough, washing the cows, used clean cloth to dry udder after washed, discarded first milk flow and streamed floor with water after milking. Previous to the implementation of those treatments, farmers were given some information pertaining to hygienic milking procedure and were shown a good example of manure handling (biogas production).

Table 1. Practical dairy farming during the existing condition and treatment

Activities	Existing condition	Treatment
Milking frequency/day	1	1
Cleaning floor, water and feed trough	No	Yes
Washing cow	No	Yes
Washing udder and teats	Yes	Yes
Used clean cloth to dry udder after washed	No	Yes
Discarded first milk flow	No	Yes
Streamed floor with clean water after milking	No	Yes
Used clean and dry milk container	Yes	Yes
Filtering milk harvest	Yes	Yes

Effect of improving pre-milking sanitation on milk quality

Implementation of some activities prior to milking, namely cleaning floor, water and feed trough, washing cow, used clean cloth to dry udder after washed, discard first milk flow and streamed floor after milking has increased milk quality. It was indicated by lower acidity level 0.14% vs. 0.19% and longer reductation time of MBRT from 6.8 to 8.0 hours (Table 2). The time of reduction being 8.0 indicated low number of bacteria in milk (less than 2 million). Pre-milking treatment which presumably increased milk quality were drying udder and teat after washed. It was obtained by [3] that wet milking was a major cause of high initial of bacterial count. This might be due to dripping of surplus water that contained bacteria from udder into milk. The fact that higher degree of wetness of udder and hand of milker helped leaching of dirt and bacteria from teat, udder and hand to milk. According to [8] the use of bare hand for drying udder was common in small farms but it was not sufficient drying of udder. Wet teat allowed skin and environment bacteria to have easy access in mammary gland. In this study

farmers were suggested to use clean cloth to dry udder because cleaning and washing were not sufficient to reduce number of bacteria in milk. It was suggested by [4] to restrict the utilization of water to cleanse the teat because the more water being used, the harder it is to dry off teats. According to [2] sanitation of teat end at milking helped to remove manure and pathogen that accumulated at the teat. Report of similar study in smallholder dairy farm indicated that improper milking hygiene, lack use of disinfectant post milking associated to high prevalence of subclinical mastitis. Bacterial pathogen which dominated by *coagulase-negative staphylococci* was found as a result of poor milking hygiene. This type of bacteria commonly colonized in the teat end and teat canal. The use of post milking disinfectant will control this type of bacteria and sub-clinical mastitis [5].

Table 2. Milk quality of cow during the existing condition and after treatment

Variables	Existing condition	After treatment
Alcohol test	Negative	Negative
pH	6.6	6.7
Acidity (%)	0.19 ^a	0.14 ^b
Reduction time of MBRT (hours)	6.8 ^a	8.0 ^b
Milk density	1.026 ^a	1.028 ^b
Fat (%)	3.0	3.8
Total solid (%)	10.6	12.2
Solid non fat (%)	7.6 ^a	8.3 ^b

a, b) means within row with different superscripts were significantly different at $P < 0.05$
 MBRT = methylene blue reduction test

Based on the result of the reduction time of MBRT, milk in this study slightly higher in microbial content in compared with maximum number required by National Standard. Discarding first milk flow seemed helping to achieve this quality level by reduced number of bacteria in milk. To achieve high milk quality as required by SNI [7], the number of bacteria should less than 500/ml. Based on the reduction time of MBRT, the duration has to be longer than 8 hours. In this case teat dipping was suggested to be applied. According to [3] proper cleaning and disinfection of cow' udder and equipment reduced coliform count to be less than standard.

Solid non fat in milk after treatment was higher than that in milk of existing condition. This was probably indirect effect of clean environment, which provided good animal welfare. Bacteria and odor disappeared from remained feed in the trough, so that feed consumption

increased. High sanitation was also needed to maintain reproductive performance of cows. The clean environment might ensure success of insemination, therefore reduced S/C and shorten calving interval. Overall the quality of milk produced by smallholder in the group of study village was close to standard SNI, but number of microbial in milk need to be reduced. Teat dipping probably will help to achieve low number of bacteria in milk.

CONCLUSION

Improving environmental and pre-milking sanitation increased milk quality, indicated by reduction in milk acidity and number of bacteria in milk. The treatment which significantly increased milk quality were washing and drying udder with clean cloth during pre-milking sanitation.

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