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Relationship between Milker's Personal Hygiene and Sanitation with Contamination of *Escherichia coli* in the Fresh Goat Milk of Etawa in Boyong Hargobinangun Village, Pakem, Sleman

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ABSTRACT

Background: Goat milk of Etawa is one of the fresh milks which contains the perfect nutrition of body need close to be breast milk. The composition is such as carbohydrates, fats, proteins, vitamins and water. Sometimes the important nutrient loses because of contaminated by environmental factors. Other factors that influence the quality of goat milk of Etawa are the udder, feces, water, soil, dust, handling breeder/milker, equipment, and air. The most common of contaminant is bacteria, particularly *Escherichia coli*. The aim of this study is to determine the association of personal hygiene and sanitation milker with the contamination of *Escherichia coli* in fresh goat milk Etawa in Boyong Hargobinangun Village Pakem Sleman, Yogyakarta Province. **Methods:** This was a quantitative cross-sectional study. The sampling method used technique purposive sampling by using inclusion and exclusion criteria. Totally 34 cow milker interviewed and the milk sample tested in laboratory. **Results:** 15 of 34 milker did not practice good personal hygiene (44.1%); 15 of 34 milker did not have good sanitation. Laboratory test revealed 13 of 34 milk sample contaminated by *Escherichia coli* (+), and the rest were (-). Result of Chi-square test presented that personal hygiene of milker statistically associated with contamination of *Escherichia coli* (p-value = 0.049) and sanitation did not associate with contamination of *Escherichia coli* (p-value = 0.867). **Conclusion:** Personal hygiene of milker associated to contamination of *Escherichia coli* in fresh goat milk Etawa in the Boyong Hargobinangun village, Pakem Sleman in 2017.

Keywords: Evaluation, POMP for filariasis, Filariasis elimination

INTRODUCTION

Background

In the past 7000 years ago, goat has been somesticated after dog, horse and sheep. Goat husbandry will give benefit in term of infestation, meat, and milk, particularly species of Etawa. Etawa goat has production index 1.65 goatling/female/year and milk production potential around 0.5-2.1 liters/day/lactation⁽¹⁾. Consume milk is useful to suffice the high protein for body and brain cells development⁽²⁾. However, the high good nutrient of this goat milk will not meet the purpose if it contaminated by something damage. The contaminant might come from the unclean cage, fur, feces, water, dust, equipment, un-appropriate procedure, and air⁽³⁾. As the transmission media, milk can be causing the milk borne disease that can transfer a disease. Goat milk is a good nutrient either for human or bacteria. Bacteria contaminated milk in short time period will reproduce to be many so the disease caused by milk as transmission is high, additionally because human has a low resistant level⁽⁴⁾. *Lactobacillaceae* and *Streptococaceae* are the large number of bacteria that contain the milk. On the other hand, *Escherichia coli* is easier to find but their existence is unwanted and unwilling, because even though only a few but it will influence the quality of milk⁽⁵⁾. The low of quality of milk from milker commonly caused of hygiene of cage, Entawa goat health, hygiene equipment when milking. Therefore, every step in milking should minimalize the contaminated of bacteria with a good management of milking⁽⁶⁾. Other factors that can influence the quality of milk such as time and massage, weather, disease, food, milk adulteration, and microba activity. Additionally, it could be caused when air control activity and equipment cleaning activity and

distribution from milker to dairy farm⁽⁷⁾. Actually, there are many factors affect to quality of milk, but it can prevent the contamination with a good personal hygiene and sanitation. Based on standard national Indonesia (SNI) 01-63662000, the minimum amount of *Escherichia coli* in the milk is negative 0/ml. The effect of personal hygiene and sanitation also revealed by other researchers. This study was conducted in Boyong Village, Hargobinangun, Pakem, Sleman that nearby to Merapi Mountain. There are 49 active breeders in age 31-50 years old who a half of them educated until finished the senior high school. Regarding to preliminary study to 2 of them, they did not use a mask, boot shoes, did not clean their hand with soap before and after milking, sanitation of equipment is least and goat cage too close to main house, so they could oversee that goats. Furthermore, there was not insufficient treatment routinely including bathing and cutting nails.

Goal

This research aimed to examine the association between hygiene and sanitation of milker with *Escherichia coli* freshly.

METHODS

This research was quantitative with cross sectional approach. Sample in this research were taken by purposive sampling as inclusion and exclusion criteria. Population in this research were 49 milker and sample were 34 milker of Etawa goat milk in Boyong Hargobinangun Pakem Sleman. Instrument of this research was the full questionnaire from research conducted by Perwira. Laboratory test was done to identify *Escherichia coli* in fresh goat milk of Etawa milked at 05.00 AM WIB.

RESULTS

Descriptive Analysis

This research employed 34 respondents milker of fresh goat milk Etawa in Boyong Hargobinangun village, Pakem Sleman. The table below describes the characteristics of respondents:

Table 1. Distribution of sex, educational level, age, personal hygiene of milker, sanitation and contamination *Escherichia coli* in fresh goat milk of Etawa in Society husbandry in Boyong Hargobinangun village, Pakem, Sleman

No	Variables	Frequency	Percentage
1.	Sex		
	- Male	27	79.4%
	- Female	7	20.6%
2.	Educational level		
	- Elementary school	14	41.2%
	- Junior high school	3	8.8%
	- Senior high school	17	50.0%
3.	Age		
	- ≤ 30 years old	4	11.8%
	- 31-50 years old	21	61.8%
	- > 50 years old	9	26.5%
4.	Category of personal hygiene's milker		
	- Not good	15	44.1%
	- Good	19	55.9%
5.	Category of sanitation		
	- Not good	19	55.9%
	- Good	15	44.1%
6.	Category of contamination <i>Escherichia coli</i>		
	- Positive	13	38.2%
	- Negative	21	61.8%
	Total	34	100%

According to table 1 above, distribution of milker regarding sex, mostly they were male (27 milkers/ 79.4%). Educational level of milker consists of a half graduated from senior high school and the highest age range were in 31-50 years old (61.8%). Regarding personal hygiene, more than a half of them including in good category (55.9%). On the other hand, more than a half of milker including in not good sanitation (55.9%). Distribution of *Escherichia coli* of milk specimen was found that 13 positively contaminated (38.2%) and 21 was found negatively contaminated (61.8%).

Bivariate Analysis

Bivariate analysis aims to identify relationship between independent variables and dependent variable. Statistical test done in this study was Chi-square with p-value 0.05.

Table 2. Relationship between personal hygiene of milker and contamination of *Escherichia coli* in fresh goat milk of Etawa

Personal hygiene of milker	Contamination of <i>Escherichia coli</i> in fresh goat milk of Etawa				Total		RP (95% CI)	P-value
	Positive		Negative		n	%		
	f	%	f	%				
Not good	9	26.5	6	17.6	15	44.1	2.850 (1.087-7.472)	0.049
Good	4	11.7	15	44.2	19	55.9		
Total	13	38.2	21	61.8	34	100		

Table 2 describes the chi-square results, it was found the positive association between personal hygiene of milker and contamination of *Escherichia coli* ($p=0.049$). Ratio prevalence was 2.850 (95% CI: 1,087-7.472), it means that milker who had not good personal hygiene will increase the risk to contaminate *Escherichia coli* in fresh goat milk Etawa by 2.85 times compared with milker who had good personal hygiene. The RP more than 1 and CI range was not exceeded 1 can be concluded that personal hygiene of milker was the risk factor of contamination *Escherichia coli* in fresh goat milk.

Table 3. Relationship between sanitation and contamination of *Escherichia coli* in fresh goat milk of Etawa

Sanitation of milker	Contamination of <i>Escherichia coli</i> in fresh goat milk of Etawa				Total		RP (95% CI)	P-value
	Positive		Negative		n	%		
	f	%	f	%				
Not good	8	23.5	11	32.4	19	55.9	1.263 (0.519-3.073)	0.867
Good	5	14.7	10	29.4	15	44.1		
Total	13	38.2	21	61.8	34	100		

Regarding table 3, Chi square test revealed the not significant level between sanitation and contamination of *Escherichia coli* because p-value >0.05 ($p=0.867$).

DISCUSSION

Personal Hygiene Milker

From total 34 respondents, it was found that 44.1% of milker did not have good personal hygiene while 55.9% of them had good personal hygiene. Most milker rarely wash their hands with soap / disinfectant before or after milking by not using warm water, they only wash their hands using water in the shelter that has been provided. It is very rare to find a milker who uses a complete PPE such as a mask and head covering / hat, whereas such PPE is useful to reduce bacterial contamination from the mouth and head that has the potential to contaminate milk during the milking process. Milkers also do not have special clothing to wear during the milking process. In addition, most milkers do not carry out regular health checks to health workers to find out whether there is an infection or disease in themselves.

Sanitation

As many as 55.9% of milkers were found did not practice good sanitation while 44.1% of milkers did good sanitation. Generally, the cage is located close to the house and there are even some that are attached to the house and there are still many milkers who did not have a PE goat dung shelter specifically, they leave PE goat droppings directly under the cage and some are attached to the bamboo used as the base of the cage which can cause odor and potentially contaminate milk during milking. The results of this study are in line with previous research, which states that microorganisms can grow on the surface of the bucket possibly because the equipment was not washed properly, only rinsed using water in a cage, so that fat did not dissolve and become a food source of microorganisms⁽⁸⁾.

Escherichia coli contamination

The results of univariate analysis of fresh goat milk of Etawa samples in laboratory tests were 13 milk samples or 38.2% of fresh goat milk taken positive or contaminated with *Escherichia coli* and 21 milk or 61.8% negative or not contaminated with *Escherichia coli*. The quality of fresh goat milk has been regulated by the government in the national standard (SNI) 01-6366-2000 revealed that *Escherichia coli* bacteria in goat milk of Etawa (unpasteurized) whether to be consumed directly or for processing and further processing must be negative or 0 ml. From the sample taken in Boyong Hargobinangun Village, Pakem Sleman, it can be concluded that 13 samples of fresh milk did not comply with SNI 01-6366-2000 standards and 21 samples of fresh milk according to SNI standards.

Relationship between Personal Hygiene and *Escherichia coli* Contamination

Statistically between personal milking personal hygiene with contamination of *Escherichia coli* bacteria in fresh goat milk of Etawa are associated, p value <0.05 ($p = 0.049$). This study supports the previous research, which states milking hygiene is related to the total plate count in cow's milk $p = 0.005$ ⁽⁹⁾. This study is in accordance with previous research, which states that milking hygiene can significantly influence the bacteriological amount in milk $p = 0.039$ ⁽¹⁰⁾. Research alike stated that maintaining cleanliness of the udder area had no significant effect on the number of dairy product bacteria, but poor milking hygiene and transportation could increase bacterial contamination of *Escherichia coli* and *S.aurens*⁽¹¹⁾. Bacterial contamination in milk can be controlled by controlling identified risk factors⁽¹²⁾. The possibility of contamination of fresh milk by *Escherichia coli* bacteria comes from the milking hands. Because they wash their hands only with water instead of warm water, some even did not use soap or disinfectants so that it is possible there are bacteria still attached to the palm of the milking hand. A similar study states, before milking a hand, the milker must first be washed with soap and brushed thoroughly. Incomplete use of PPE in Boyong hamlet by a milker like masks, boots, gloves and headgear / caps can cause bacterial contamination of milk. Germs from the mouth or hair can move at any time through any media such as air. Therefore, the complete use of PPE is aimed at such matters⁽¹³⁾.

Relationship between Sanitation and *Escherichia coli* Contamination

Statistically there was no significant relationship between sanitation and *Escherichia coli* bacterial contamination because p value <0.05 ($p = 0.867$). This is likely that there are other more dominant factors which cannot be controlled by researchers such as the quality of water used by the milker. Most milkers in Boyong Hamlet did not wash milking equipment with warm water in order to kill microbes. Most of them only use storage water to clean it. While the physical condition of the water reservoir did not meet the standards. It is probable that the water in the reservoir is contaminated with *Escherichia coli* or other bacteria, and can contaminate milk during the milking process. For that the previous tools must be washed using clean water if necessary using detergent and rinsed with hot water ($60-70^{\circ}\text{C}$) to kill microbes and dissolve milk fat attached to the tools, then the tools are dried. Unclean equipment can cause milk to contain a lot of microbes / germs⁽¹⁴⁾. This study is not supporting the previous research, which stated the quality of fresh cow milk produced and marketed in the study area was very poor, due to poor sanitation from milk containers, cleanliness of the udder, and not using detergent to clean the equipment used. Therefore, there needs to be improved sanitation to reduce contamination in fresh milk⁽¹⁵⁾. Previous research has stated that up to now only goat milk and fresh camel milk have been linked to epidemics, because there have been no reports of outbreaks for other species. A contributing factor to this could be the fact that goat's milk and fresh camel's milk are consumed more than fresh milk from other animal species besides cattle. But the list displayed is not complete, because not every case or outbreak is reported. In addition, not every case or epidemic is associated with the source of infection⁽¹⁶⁾.

Considering that fresh goat's milk of Etawa is susceptible to microbes and pathogenic bacteria, it is better to consume fresh milk that has been through a process of heating or minimal pasteurization so that the bacteria in milk can be controlled.

CONCLUSION

From the results of research and discussion related to the personal relationship of milker hygiene and sanitation with contamination of *Escherichia coli* in fresh goat milk of Etawa at the society husbandry in Boyong Hargobinangun Pakem Sleman 2017, it can be concluded:

1. Personal hygiene milking fresh goat milk of Etawa at the society husbandry Boyong Hargobinangun Pakem Sleman 2017 had a good majority of 55.9%.
2. Sanitation milking of fresh goat milk of Etawa in the majority of the Boyong Hargobinangun Pakem Sleman hamlet in the majority of 2017 was not good, which was 55.9%.
3. Contamination of *Escherichia coli* milk fresh goat milk of Etawa in the husbandry of Boyong Hargobinangun Pakem Sleman 2017 was 13 (38.2%) positive or contaminated with *Escherichia coli* and 21 (61.8%) negative or uncontaminated.
4. There was a relationship between personal hygiene of milker and contamination of *Escherichia coli* in fresh goat milk of Etawa at the Boyong Hargobinangun village, Pakem, Sleman in 2017.
5. There was no relationship between sanitation and contamination of *Escherichia coli* in fresh goat milk of Etawa at the Boyong Hargobinangun village, Pakem, Sleman in 2017.

The suggestions that can be submitted by researchers based on the results of the study are as follows:

1. The Yogyakarta District Livestock Service Office of Yogyakarta Regency and Anggayuh Makmur Dairy Cooperative are expected to be able to increase their efforts in providing guidance and counseling to goat milk of Etawa agents. Especially those who had a private cage to improve personal hygiene in the milking process so that the level of fresh milk pollution by microbes could be minimized.
2. Husbandry of Etawa goat are expected to be able to improve personal hygiene in milking to reduce microbial contamination in milked goat milk of Etawa. Specifically, the behavior of washing hands with soap / disinfectant before milking, and the use of PPE.
3. The further researchers are expected to be able to examine the content of other pathogenic bacteria in milk that can cause health problems such as *Salmonella sp* bacteria and be able to examine the microbial quality of the water used by the milker in milking activities.

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