

CHAPTER 1 INTRODUCTION

1.1 Background of Research

Milk is referred to as a near-perfect food because of its complete nutritional values. More than 100,000 types of food molecules are found in milk. Milk contains water, fat, carbohydrates, enzymes, proteins, vitamins A, B, C, and D. Milk is needed by humans to build and maintain the body's cells, maintain the body's metabolism, as a source of prebiotics, a source of calcium and to repair damaged tissues (Astawan, 2008). Milk contains the nutrients needed for humans and as a suitable place for the growth of bacteria. Bacteria that contaminate milk in a short time will multiply to a large number so that the number of cases of infection associated with raw cow's milk is quite high (Chandra, 2007).

Raw milk that is Aman (safe), Sehat (healthy), Utuh (whole), and Halal (ASUH) is an indicator that is used as a condition to be consumed. Aman Sehat Utuh Halal food requirements include: (1) Does not contain prohibited goods; (2) Does not contain infectious animal disease causative agents and residues of harmful materials such as antibiotics, heavy metals, hormones, and pesticides; (3) Not added or subtracted anything; and (4) Contains sufficient and balanced nutrients (Gustiani, 2009).

According to Chye *et al.* (2004) milk contains a low number of bacteria when removed from a healthy udder. However, the number of bacteria can increase when stored for a long time at room temperature (25°C). Milk is an excellent growth medium for bacterial growth.

The possibilities that can cause milk to be contaminated with bacteria are water, dirt and contaminating soil during the milking process. Pathogenic microorganisms that cause *foodborne diseases* related to milk are *Salmonella sp.*, *Listeria monocytogenes*, *Campylobacter sp.*, *Staphylococcus aureus*, *Bacillus cereus*, and *Clostridium botulinum*. *Staphylococcus aureus* is a very important pathogenic agent that causes infection of the udder glands of dairy cows (André *et al.*, 2008). The sources of bacteria that contaminate cow's milk generally come from nipple ducts, infected udder tissue, hand hygiene, contaminated water and feces (Altalhi *et al.*, 2009). Excessive bacterial contamination in milk can cause several diseases including dysentery, typoids, tuberculosis, and salmonellosis. Therefore, it is important to maintain the safety and quality of dairy milk (Navyanti, 2015).

Based on Cahyono *et al.* (2013), stated that the condition of the cleanliness of the cow showed greatly affects the content of microbial contamination in cow's milk. Microbiological quality of fresh milk in Krucil District, Probolinggo Regency has an average TPC of 7.4×10^5 cfu/ml, the number of *Enterobacteriaceae* contamination 7.5×10^2 cfu/ml and *Staphylococcus aureus* contamination 7.9×10^1 cfu/ml.

Medowo Village, Located in Kandangan District of Kediri Regency is one of the potential villages in the dairy farming sector. Based on the KUD Kertajaya's archive (2021), there are 691 dairy farmers with a population of 2363 dairy cows. In Medowo village some farms already use milking machines and some of them are still using conventional or milked by hand.

Two different milking techniques between milking machines and traditional hand milking are certainly very influential on the minimum number of bacteria required in milk. The amount of these bacteria greatly affects the quality of milk. The level of hygiene between milking using a machine and traditionally hands milking also greatly affects the number of bacteria in milk. The microbiological quality of raw milk is one of the quality standards that need to be considered (Chandra, 2007).

Based on the description above, study is needed to compare the total number of bacteria in Raw cow's milk that is milked using machines and traditionally using hands on farms in the Medowo Village area of Kandangan District of Kediri Regency.

1.2 Problem Statement

Is there any difference in the total number of bacteria in raw cow's milk that is conventionally milked by hand than milked using a milking machine on farms in the village area of Medowo Kediri?

1.3 Aim of Research

The purpose of the study is to compare the total number of bacteria in raw cow's milk between milking using milking machines and traditional hand milking.

1.4 Outcome of Research

1.4.1 Theoretical outcome

The benefits of this study are to provide scientific information on conventional milking techniques and use milking machines against the number of bacteria in raw cow's milk.

1.4.2 Practical outcome

This research provides information on the importance of sanitation and hygienic milking techniques, so that milk is safe for public health, and the quality of milk can improve. This research can also be used as a reference for similar research to come.

1.5 Theoretical Base

According to SNI 01-3141-2011 (BSN, 2011), Raw milk is a liquid derived from a healthy and clean cow's udder, obtained by correct milking technique, whose natural content is not reduced or added anything and has not received any treatment except cooling. Microbes can contaminate milk from the time it is milked, processing it to consumers. While still in the udder milk, the milk is still sterile, contamination can occur after coming out of the udder due to several sources of pollutants (Pradika *et al.*, 2019). According to Suwito (2010), after being milked, milk contains microbes less than 5×10^3 CFU/ml, and if the milk is placed at room temperature, the number of bacteria in milk will increase, the longer duration milk located in room temperature the higher the number of bacteria present in milk.

Based on the National Standardization Agency (BSN) on National Standard (SNI) no. 01-6366-2000, there is a maximum limit on the total number of microbial contamination allowed in Raw milk which is 1×10^6 CFU / ml. *Total Plate Count* (TPC) examination is a requirement to know the quality of Raw milk (BSN, 2011). The number of bacteria more than 1×10^6 CFU /ml will accelerate the development of bacteria and the formation of toxins causing more damage to milk if stored for more than 5 hours at room temperature, and not cooled which causes parts of the milk processing industry will reject milk (Hernawati, 2014).

The average cow business in Indonesia is dominated by small-scale farmers who still use conventional milking method by hand. There are also medium-scale and large-scale farmers who already use machines to milk. Of course, the two milking methods have differences in the level of cleanliness and the amount of milk that can be milked (Motherland, 2011).

Milking with hands must be done carefully and smoothly, so that it does not affect the milk production produced by dairy cows. Manual milking techniques that are carried out depend on the assembly habit, some use full hand techniques, massage techniques and pinches. There are three handling techniques using hand, namely Whole Hand, Stripping and Knevelen techniques (Syarif, 2010).

The use of a milking machine must be accompanied by good machine maintenance including: (1) Machines maintenance with the Inspection, Small Repair, Medium Repair, and Overhaul method, (2) Inspection of the main components in the electrical part of the machine, straws, nipples, milk containers, (3) Cleaning and routine maintenance that are carried out proven to be able to

maintain milking machine and prevent bacterial contamination of the milking machine (Suhartono *et al.*, 2020).

Based on Kumala`s research (2018) conducted in Bedrug Village, Pulung District of Ponorogo Regency, it is known that the poor hygiene and sanitation of most of the milking in Bedrug Village resulted in the discovery of coliform bacteria whose number exceeded the requirements set by SNI. The research`s result indicates a relationship between the cleanliness of the milker and the presence of bacteria in milk.

1.6 Hypothesis

There is a difference in the total number of bacteria in raw cow's milk that is conventionally milked by hand than milked using a milking machine on farms in the Medowo, Kediri.