

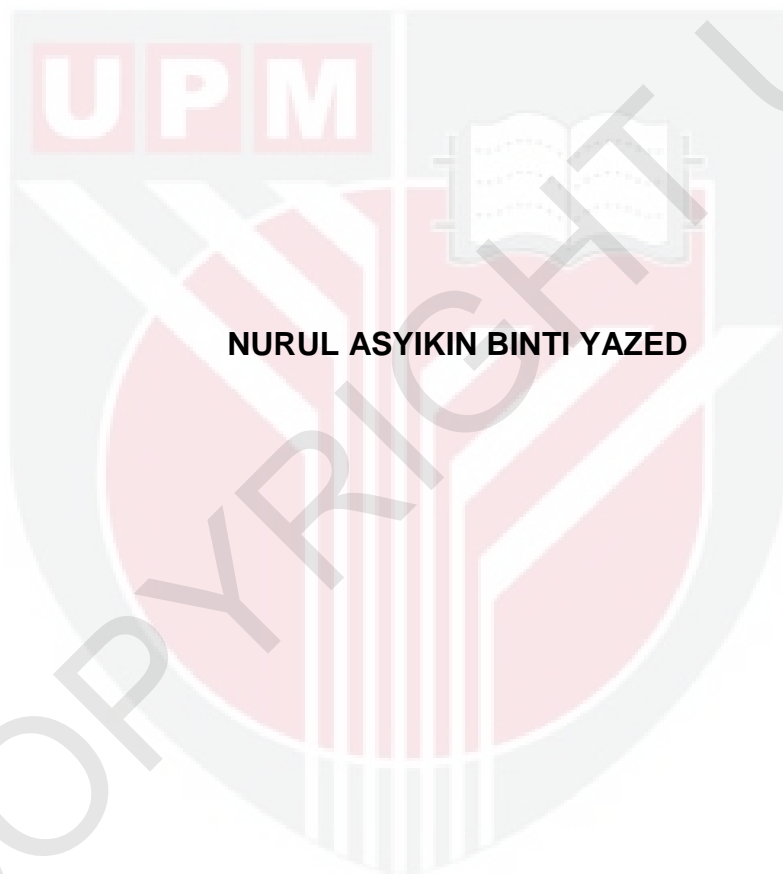


***EFFECT OF DIFFERENT MILKING METHODS ON TOTAL PLATE COUNT
AND SOMATIC CELL COUNT***

NURUL ASYIKIN BINTI YAZED

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**FACULTY OF AGRICULTURE
UNIVERSITI PUTRA MALAYSIA
SERDANG, SELANGOR**

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COUNT AND SOMATIC CELL COUNT**

BY

NURUL ASYIKIN BINTI YAZED

167765

A project report submitted to Faculty of Agriculture, Universiti Putra
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degree of BACHELOR OF AGRICULTURE (ANIMAL SCIENCE)

**FACULTY OF AGRICULTURE
UNIVERSITI PUTRA MALAYSIA
SERDANG SELANGOR**

2015/2016

CERTIFICATION

The project report entitles “Effect of Different Milking Methods on Total Plate Count and Somatic Cell Count” was prepared by Nurul Asyikin Binti Yazed and submitted to the Faculty of Agriculture in fulfilment of the requirement of SHW 4999 (Final Year Project) for the award of degree of Bachelor of Agriculture (Animal Science).

Student's name:

Nurul Asyikin Binti Yazed

Matric No: 167765

Student's signature

Certified by:

.....
Assoc. Prof. Dr. Halimatun Bt. Yaakub
Project Supervisor
Department of Animal Science
Faculty of Agriculture
Universiti Putra Malaysia
Serdang, Selangor

Date:

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LIST OF ABBREVIATIONS AND SYMBOL

%	Percent
°C	Degree Celcius
μL	Microliter
cells ml ⁻¹	cell per millilitre
cfu ml ⁻¹	colony forming unit per millilitre
CMT	California Mastitis Test
DMSCC	Direct Microscopic Somatic Cell Count
GLM	General Linear Model
SCC	Somatic Cell Count
SPC	Standard Plate Count
TPC	Total Plate Count
WWF	World Wildlife Federation

ABSTRACT

Cow milk is one of the human diets that rich in nutrient components which composed of about 86-88% water, 3.5% of protein, 3% to 4% of milk fat, 5% of lactose and 0.7% minerals depending on breeds, animal's feeding and stage of lactation as well (FAO, 2015). The TPC and SCC are two of the indicators of milk quality (Pasteurized Milk Ordinance, 2011). The objectives of this study were to evaluate, compare and test the correlation of total plate count (TPC) and somatic cell count (SCC) level in milk collected from different milking methods. This study was conducted at Milk Quality Control Laboratory, Alor Gajah Melaka and UPM laboratories. Nine dairy farms from Merlimau, Alor Gajah and Linggi were involved in this study. Milk samples were collected from 103 individual healthy Friesian and Jersey cows, which 36 of them collected samples were collected from line machine milking, 40 samples from portable machine milking and 27 samples from hand milking. Milk samples were analysed for TPC, milk compositions and SCC. Based on the analysis of TPC (log) result, the highest total plate count were significantly lower ($P < 0.05$) in milk collected from cows using line milking machine compared to portable milking machine, but no different ($P > 0.05$) compared to hand milking. There were no significant different ($P > 0.05$) in the somatic cell count and milk compositions reported in the milk collected from portable machine milking, hand milking or machine milking. In conclusion, milk collected from cows milked using line machine milking had the lowest number of bacteria when compared to hand milking and portable milking machine, but no different on the number of somatic cells in the milk or milk composition. There are minor relationship between total plate count and somatic cells count.

ABSTRAK

Susu lembu adalah salah satu diet manusia yang kaya dengan nutrien, dimana ia mengandungi 86-88% air, 3.5% protein, 3% sehingga 4% lemak susu, 5% laktosa dan 0.7% mineral bergantung kepada baka, pemakanan haiwan dan fasa laktasi (FAO, 2015). Kandungan *Total Plate Count* (TPC) dan *Somatic Cell Count* (SCC) adalah dua penunjuk untuk kualiti susu (Pasteurized Milk Ordinance, 2011). Objektif kajian ini adalah untuk menilai, membanding dan menguji perkaitan antara tahap TPC dan SSC dalam susu yang dikumpulkan daripada kaedah pemerah susu yang berbeza. Kajian ini dijalankan di Makmal Kawalan Kualiti Susu, Alor Gajah dan UPM. Sembilan buah ladang lembu tenusu di daerah Merlimau, Alor Gajah dan Linggi telah terlibat dalam kajian ini. Sample susu diambil daripada 103 ekor lembu tenusu sihat baka Friesian dan Jersey di mana 36 sampel diambil daripada kaedah perahan mesin berbaris, 40 sampel diambil daripada mesin perahan susu mudah alih dan 27 sampel daripada perahan tangan. Kesemua sample susu tersebut dianalisis untuk ujian TPC, komposisi susu dan SCC. Berdasarkan analisis keputusan TPC (log), nilai TPC paling tinggi didapati sedikit ($P < 0.05$) dalam susu yang dikumpulkan daripada lembu yang menggunakan perahan berbaris berbanding dengan mesin perahan mudah alih, tetapi tiada perbezaan ($P > 0.05$) berbanding perahan tangan. Tiada perbezaan ketara ($P > 0.05$) dalam SCC dan komposisi susu. Terdapat perhubungan kecil diantara TPC dan SCC

CHAPTER 1

1.0 INTRODUCTION

"Milk", "raw milk" or "fresh milk" means the normal, clean, fresh mammary secretion of healthy cow, buffalo, goat or sheep that is properly fed and kept, excluding that obtained during the four days immediately following calving (Food Regulations 1985). Milk is a complex food that contained fats, proteins, carbohydrates, minerals, vitamins and other micelle constituents dispersed in water (Mirzadeh *et al.*, 2010). More than 6 billion people worldwide consume milk and milk products; the majority of these people live in developing countries and 90% of the milk consumed is from dairy cattle (FAO, 2000). Cow milk is produced by the cells of the alveolus walls in the mammary gland and milk let-down occur after stimulation by having the calf to suckle the teats or using other methods similar to suckling, either using milking machine or hand milking. In Malaysia, there are three milking methods that being practised, either using line milking machine, portable milking machine, depend on the number of cows or hand milking for small number of cows.

Total plate count and somatic cell count are two methods that are commonly used to determine milk quality. Milk's nature composition that is riches with nutrients makes it favourable for the microorganism to multiply. Total plate count is a method to quantify the number of bacteria after the milk samples undergo serial dilution and incubation period, while somatic cell count is the methods to quantify the number of somatic cells presence in the milk. Total Plate count is a compulsory test for the dairy farmers in Malaysia at milk collecting centre before they receive their payment. Raw milk with high microbiological numbers or

poor sensory properties will likely lead to finished products that fail to meet established shelf-life standards and hence raw milk must be critically tested at the processing plant before the acceptance of the milk by the plant to ensure the acceptance of safe, high-quality milk, which results in benefits for the consumer (Cerva, 2015). Different milking methods affect the average value of microorganisms present in the milk and there also gives high correlation between total plate count and somatic cell count (Filipovic and Kokaj, 2009; Darand *et al.*, 2014). In contrast in the study conducted by Zeng and Escobar, 1996, somatic cell count only had minor but positive correlation with total plate count. The aims of this study were to evaluate the effect of different milking methods on somatic cell count, total plate count, milk composition and also their correlation.

1.1 PROBLEM STATEMENT

This study was carried out due to lack of knowledge on the effect of milking methods on milk total plate count, somatic cell count, composition and also their correlation.

1.2 OBJECTIVES OF THE STUDY

The general objective of this study was to study the effect of different milking methods (hand milking, portable machine milking, and line milking machine) on total plate count (TPC), somatic cell count (SCC) and milk composition.

The specific objectives of this study were:

- a) to evaluate the total plate count, somatic cell count and composition of milk sample from different milking methods

- b) to compare the total plate count, somatic cell count, and composition of milk sample from different milking methods
- c) to test the correlation between total plate count and somatic cell count.

1.3 SIGNIFICANCE OF STUDY

Somatic cell is one of the indicators of cow's udder health. It shows us the presence or level of mastitis within the udder. Mastitis is inflammation within cow's udder that will cause bad effects to the farmers in many ways. Total plate count is a method used for enumerating bacteria within milk. High numbers in bacteria, which exceed 1,000,000 cfu/ml indicate reducing quality of milk. Bacteria are one of the factors that can cause mastitis while milking method could affect the number of bacteria. Hence, this study was conducted to gain more knowledge about the effect of milking method on total plate count and somatic cell count also the correlation between them.

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