UNIVERSITI PUTRA MALAYSIA

BUFFALO (Bubalus bubalis) MILK QUALITY EVALUATION FROM DIFFERENT FARM IN THE STATE OF KEDAH DARUL AMAN

ABDUL QHANI BIN DALI

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BUFFALO (*Bubalus bubalis*) MILK QUALITY EVALUATION FROM DIFFERENT FARM IN THE STATE OF KEDAH DARUL AMAN

ABDUL QHANI BIN DALI

A project paper submitted to the Faculty of Veterinary Medicine, University Putra Malaysia in partial fulfilment of the requirement for the DEGREE OF DOCTOR OF VETERINARY MEDICINE Universiti Putra Malaysia, Serdang, Selangor Darul Ehsan.

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CERTIFICATION

It is hereby certified that we have read this project paper entitled "Buffalo (*Bubalus bubalis*) Milk Quality Evaluation from Different Farm in the state of Kedah Darul Aman.", by Abdul Qhani bin Dali and in our opinion, it is satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement of the course VPD 4901 – Project.

PROF. DR. MD. ZUKI BIN ABU BAKAR@ZAKARIA

DVM (UPM), Ph.D (GLASGOW)

Lecturer

Faculty of Veterinary Medicine

University Putra Malaysia

(Supervisor)

DEDICATIONS

To God Almighty Allah my creator

My beloved family,

Ayah

Mak

Brothers

Sisters

And Friends

Thank you for the unconditional love and endless support

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much knowledge as I can for research and scientific writing though this simple, yet a challenging project.

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Oleh

Abdul Qhani bin Dali

2018

Penyelia: Prof. Dr. Md. Zuki bin Abu Bakar

Fakulti: Fakulti Perubatan Veterinar

Kajian ini bertujuan bagi menilai kualiti susu kerbau yang dihasilkan daribeberapa ladang di negeri Kedah Darul Aman, Malaysia. Sampel susu mentah telah dikumpulkan secara rawak dari lima ladang yang menghasilkan susu kerbau menggunakan baka Murrah yang diuruskan dalam sistem semi intensif bersepadu. Ladang-ladang tersebut terletak di tiga daerah di negeri Kedah iaitu Kuala Ketil, Kulim dan Pendang. Lima parameter terpilih telah diguna pakai dalam menentukan kualiti susu kerbau iaitu takat kestabilan susu, kualiti penyimpanan, komposisi, sisa antimikrobial dan status kebersihan. Analisis takat kestabilan susu ditentukan melalui ujian alkohol 80%, manakala kualiti penyimpanan telah ditentukan menggunakan Ujian Penurunan Warna Metilena (MBRT). Analisis komposisi susu kerbau yang merangkumi penentuan kandungan lemak, protein, laktosa, pepejal tanpa lemak dan jumlah pepejal telah dijalankan dengan menggunakan Lactoscan Milk Analyzer yang ditentukur khas untuk susu kerbau. Analisis untuk penentuan

sisa antimikrobial di dalam susu telah dijalankan menggunakan teknik Kit Ujian Delvo. Penghitungan mikrob dijalankan menggunakan metodologi hitungan cawan (TPC). Kedua-dua ujian alcohol 80% dan MBRT menunjukkan keputusan negatif, menandakan kestabilan susu dan beban mikrobial berada pada tahap yang baik. Analisis komponen kimia serta komposisi susu menunjukkan hasil lemak, protein, laktosa, kandungan pepejal bukan pepejal dan pepejal agak rendah berbanding dengan piawaian untuk susu kerbau dan juga artikel-artikel yang diterbitkan. Tiada sisa antibiotik yang dijumpai dalam keseluruhan sampel dan juga hasil penghitungan mikrobial tidak melebihi nilai yang ditetapkan dalam Malaysia Food Regulation (1985). Oleh itu, kajian ini menyimpulkan bahawa susu kerbau yang dihasilkan di negeri Kedah mempunyai kualiti yang baik.

Kata kunci: Susu kerbau, parameter kualiti susu, kerbau (*Bubalus bubalis*), Kedah

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4901 – Project.

BUFFALO (*Bubalus bubalis*) MILK QUALITY EVALUATION FROM DIFFERENT FARM IN THE STATE OF KEDAH DARUL AMAN

By

Abdul Qhani bin Dali

2018

Supervisor: Prof. Dr. Md. Zuki bin Abu Bakar

Faculty: Faculty of Veterinary Medicine

The present research aimed to evaluate the quality of buffalo milk produced from different farm in Kedah. Raw milk samples were randomly collected from five buffalo farms of Murrah breed managed in integrated semi-intensive system, located in three district of Kedah which are Kuala Ketil, Kulim and Pendang. Five selected parameters were used in determination of the buffalo milk quality which are the milk stability, keeping quality, composition, antimicrobial residue and sanitary and hygienic status. Analysis of milk stability and keeping quality was determined through alcohol test and Methylene Blue Reduction Test (MBRT) respectively. Analysis of the buffalo milk composition such as fat, protein, lactose, total solids and solid non-fat were carried out using Lactoscan Milk Analyzer calibrated for buffalo milk. Analysis of antimicrobial residue were carried out using Delvo Test Kit technique. Microbial enumeration was carried out using Total Plate Count technique

in order to determine the sanitary and hygienic status of the milk. Both alcohol test and MBRT reveal negative results, indicating good milk stability and keeping quality. The analysis of the chemical components as well as composition of the milk shows the result of fat, protein, lactose, total solid and solid non-fat content were quite low than the standard value for buffalo milk and also published articles. No antibiotic residues were found in the totality of the sample and also the microbial enumeration result does not exceed the value set in Malaysia Food Regulations (1985). Thus, this study concluded that the buffalo milk produced in the state of Kedah are ofgood quality.

Keywords: Buffalo milk, milk quality parameter, buffalo (*Bubalus bubalis*), Kedah,

INTRODUCTION

Milk can be defined as a white liquid produced by the mammary gland of mammalian and it is considered as an almost complete food for human diet (Khedkar et al., 2016). It is the most important source of nutrition for young mammals before they grow up as all of the essential nutrients that can be found in milk are protein, fat, lactose, vitamins, and mineral matter for normal growth and performing different functions for the body systems (Khedkar et al., 2016). Usually for human consumption, especially in Malaysia, most of the population tend to consume more cow and goat milk. Not to forget the mother's milk, these two types of milk often being the most preferable choice of replacement for mother's milk. However, buffalo milk also has the potential to be one of the popular milk for consumption in Malaysia.

The domesticated water buffalo are scientifically known as *Bubalus bubalis* (Abd El-Salam and El-Shibiny, 2011). Water buffalo can be further divided into two sub-species, which are the river type and the swamp type (Shaista et al., 2017). In Malaysia, the water buffalo or simply known as Malaysian buffalo is a swamp type and can be found in the western peninsular of Malaysia (Mason, and I.L, 1996). Buffalo can be a source of draft power, transportation, on-farm manure, meat, milk and livelihood of the farmers. Buffalo have remarkable potential in utilizing the agricultural crop-residue and by products, due to the fact that they have been raised by the rural farmers in the harsh environment (Wanapat and Kang, 2013).

Recently, buffalo milk production in Asia represents 96.78% of the total volumes of world's buffalo milk which is estimated at 89.2 Million tons. Production in South and Southwest of Asia, are dominated by India and Pakistan, in which 93.17 % of world buffalo milk production come from these two countries (FAO, 2010). China is among the largest producer countries of buffalo milk, with both buffalo herds and buffalo milk production listed third worldwide in 2004, after those of India and Pakistan (FAO, 2004). As stated by Wanapat and Kang (2013)the average annual growth rate in buffalo milk production in the whole of Asia between the years 1998 to 2008 was 4.39%. Currently, Myanmar entitled as the highest buffalo milk producer among the South East Asia countries due to the reason that it had the highest population of dairy buffalo (Hlaing, 2001). In other South East Asia countries, the buffalo milk production is currently very low as the farmers tend to use their animals mainly for work only (Wanapat and Kang, 2013).

Generally, buffalo milk is among the milk that having high nutritional content characterized by high level of solid constituents (Bailone et al., 2017). Wanapat and Kang (2013) stated that buffalo milk contains higher composition of total solids, fat, protein and lactose as compared to cow milk. This is also being reported by Araújo et al. (2011), saying that 'the great advantage of buffalo milk in relation to cow milk (*Bos taurus*) is precisely its high amount of fat, protein, lactose, dry extract, and total solids'. Buffalo milk is much healthier as it is higher in saturated fatty acids (Wanaphat and Kang, 2013). This is further supported by studies done by Van Nieuwenhove et al. (2004) and he concluded that, buffalo milk and cheese are a good source of Conjugated Linoleic Acid (CLA) for human nutrition. Swamp buffalo milk

has even higher fat (7.9%), protein (4.2%), Calcium (264.0 mg/100 g) and Cholesterol (0.65 mg/g).

There are many parameters that can be used as an indicator to define a quality milk. Some of the popular milk quality parameter being used in most developed countries are the Somatic Cell Count (SCC) and the total plate count (TPC) and the evaluation of these two parameters for bulk milk regarded as an internationally recognized method to establish milk quality as well as the udder health status of the cows in the herd (Cicconi-Hogan, 2013). Other milk quality parameter such as composition and physical-chemical characteristic can also be used (Pasquini et al., 2017). In this study, five parameters were chosen based on their availability to indicate quality of buffalo milk, which are the milk stability, keeping quality, composition, antimicrobial residue and sanitary and hygienic status. Analysis of milk stability was determined through alcohol test, while keeping quality was determined through Methylene Blue Reduction Test (MBRT). Analysis of the buffalo milk composition which include the determination of fat, protein, lactose, total solids and solid non-fat were carried out using Lactoscan Milk Analyzer calibrated for buffalo milk. Residues for antimicrobial analysis were carried out using Delvo Test Kit technique. Microbial enumeration was carried out using Total Plate Count technique in order to determine the sanitary and hygienic status of the milk. Milk analysis can be used to detect the presence of antimicrobial drugs used in the treatment of cattle infection (Bailone et al., 2017).

In short, buffalo milk actually possesses significant advantage to be developed in our country. However, since the quality evaluation of the buffalo milk in Malaysia

particularly are less studied, therefore, as a beginning, this study aim is to evaluate the quality of buffalo milk being produced from different buffalo farms in the state of Kedah. We hope that, the information from this study could be useful in the future, when the consumption of buffalo milk and by product becoming more popular and important in the country and in the region.

Hypothesis

The buffalo (*Bubalus bubalis*) milk from different farm in the state of Kedah are of good quality.

Objectives

This study was conducted to evaluate the quality of buffalo milk produced from different farm in the state of Kedah.

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