International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249-8958 (Online), Volume-8 Issue-4, April 2019

Effect of Banana Leaf and Plastic Material Packaging on Microbial Contamination Dangke Fresh White Cheese

Muhammad Askari Zakariah, Ratmawati Malaka, Amran Laga, and Ambo Ako

Abstract*: Dangke is local cheese from enrekang regency, south Sulawesi, Indonesia. On market, dangke fresh cheese was sold by packaging from banana leaf material. This study was aimed at comparison effect packaging material using banana leaf and plastic. Methodology of this research were identified using exploratory descriptive of microbial contamination of dangke was packaged by banana leaf and plastic, which store time one week. Result showed that most probable number coliform by banana leaf lower than plastic material were $2x10^9$ and $2.4x10^9$MPN/g respectively, most probable number same amount. However, microbial contamination, totally above national standard of maximum microbial on cheese product. Concluded that banana leaf as material packaging for dangke product could be potentially to reduce microbial contamination.

***Index Terms*: Banana leaf, Plastic, Packaging, Microbial contamination, and Dangke.**

I. INTRODUCTION

Low consumption level Indonesian people's milk, among others, is caused the price of milk is relatively high because it is generallyis an imported product, because of dislike the culture of drinking milk is still low, and cases of milk lactose intolerance unusual for consuming milk from an early age.

Given the importance of milk for improving the quality of Indonesian human resources, then efforts increasing milk consumption is absolutely necessary, including processing milk in various ways processed form. Several regions in Indonesia have traditional dairy products such as dali in North Sumatra, curd in West Sumatra, cologanti in East Nusa Tenggara, and dangke in South Sulawesi which indicates that the Indonesian people have long known milk as food ingredients. Development Traditional dairy products have potential increase national milk consumption because has long been known and consumed by the public so it's easier to accept and cases milk intolerance can be avoided.

Dangke is local cheese from Enrekang regency, South Sulawesi, Indonesia. Dangke was made from buffalo or/ cow milk as a raw material and processed with help of milk clotting protease enzyme from papaya leaves and fruit. The mixture is beaten and then the milk protein clots, the clot is kept in the mold of a coconut shell, and then covering/packaging by banana leaf. The final stage of the process of making dangke is packing / packaging of lumps already printed. Dangke packaging material the most used by workers are banana leaves. This can understandable because many banana leaves are available in the countryside so they are easily obtained without having to issue production costs, other than their nature elastic so it's easy to use. Some workers also pack dangke in rigid polyethylene plastic for cake packaging because it meets consumer demand with reasons for ease of product transportation. Way wrapping can be done by all workers leave a portion of the upper surface of it not covered with banana leaves does give unique and interesting appearance, but thing this can increase the possibility product contaminated with contamination from the environment around.

The quality of dangke fresh white cheese is reduced by packaging method. This loss can be kept at minimum microbial contamination by improving good packaging through use of packaging material or through improving traditional packaging practices. Therefore, this study was aimed at comparison effect packaging material using banana leaf and plastic. The specific objective of the present study was to evaluate the effect of packaging material on microbial contamination on dangke fresh cheese.

II. MATERIAL AND METHOD

Dangke got from tradition home industry Producers in Enrekang Regency, research was done on April 2018, while the dangke chemical quality was evaluated in Feed Chemical Laboratory, Animal Nutrition Program, Universitas Hasanuddin, then Microbiology analysis in Health Laboratory of Makassar (Balai Besar Laboratorium Kesehatan Makassar). The analysis of protein, water, ash, and carbohydrate content of dangke samples was conducted according to AOAC[1], then fat analysis was conducted Zakariah [2].

Solid-shaped samples and large chopped and homogenized using the tools has been sterilized. A total of 10 g each sample is inoculated into in 90 mL Mac Conkey sterile broth and homogenized using vortex. Then 0.5 mL of the suspension taken and inoculated into a tube containing 4.5 mL Mac Conkey broth sterile to obtain sample suspension which has been subjected to dilution 100x.

Manuscript published on 30 June 2019.
***** Correspondence Author (s)
Muhammad Askari Zakariah*, IAI AL Mawaddah Warrahmah Kolaka, Kolaka Regency, Indonesia.
Ratmawati Malaka, Animal Science Faculty, Hasanuddin University, Makassar, Indonesia
Amran Laga, Agrotechnology Faculty, Hasanuddin University, Makassar, Indonesia.
Ambo Ako, Animal science Faculty, Hasanuddin University, Makassar, Indonesia.

The tube is taken again 0.5 mL suspension and inserted into the tube next, so on up obtained a 10-8 dilution suspension. Next, the sterile Durham tube put in each tube, and incubated for 48 hours at 37ºC[3]. After 48 hours, all the tubes will be checked the results, and recorded for calculated the estimated number of bacteria Coliform in accordance with MPN table series 3 tube FDA-BAM[4]. Suspension from the tube show positive results on the presumptive test will be inoculated to in *Escherichia coli* (EC) sterile broth. Then the Durham tube is inserted into in each tube, and incubated for 24 hours at a temperature 37ºC . The tube containing a murky suspension is interpreted as a positive tube of *Escherichia coli*. Suspension from the tube show positive results on confirmed test will be inoculated to Eosin Methylen Blue (EMB) Media, and incubated for 18-24 hours at temperature 37ºC[5]. Single Isolate which is metallic black on The EMB agar surface is a the hallmark of the colony of *Escherichia coli* [6].

Test method used in this research is qualitative test taken from the Indonesian National Standard Method which refers to Bacteriological Analytical Manual, Food and Drug Administration, AOAC International [7]. Each testing process is always accompanied by a control positive and negative.

The experiment on chemical characteristics of dangke was conducted one sample t-test. One sample t-test is a statistical procedure used to determine whether a sample of observation could have been generated by a process with a specific mean. Significance was assessed at $p \leq 0.05$. While microbiological characteristics were identified using exploratory descriptive which is research explore temporary information or unknown cases or only little is known about data collection to provide description or affirmation of a concept or symptom. The aim is to describe bacterial contamination. Tested microbial quality by Most Probable Number (MPN) method, with a formula:

$$Most\ probable\ number\ (MPN) = MPN\ on\ table \times \frac{1}{Dilution\ Middle\ Stage}$$

After obtaining the results data for the sample, then the data will then be compared to the standard values set by the Head of the Agency of Drugs and Food, Republic Indonesia (BPOM RI) Number HK.00.06.1.52.4011 in 2009 concerning the maximum limit of contamination microbes in food and beverages, if the data are analyzed exceeds the maximum threshold, it can be concluded that processed drinks it is not suitable for consumption.

III. RESULT AND DISCUSSION

The chemical composition of dangke fresh cheese from Enrekang regency on Table 1.

Fraction	Percentage per dry matter (%)
Water	58.28
Ash	1.83
Crude protein	15.57
Extract water	20.71
Carbohydrate	3.60

Protein content on this study is low content, it might be heating temperature. Higher heating temperature decreased protein and fat content. Malaka [8] showed that increasing temperature could be decrease protein and fat content, percentage of protein dangke on 75°C, 80°C, 90°C, 95°C, and 100% were 17.16%, 16.62%, 16.28%, 15.16%, 14.33%, 12.99% respectively. Turkish Standard 591 have total solid in the cheese not to exceed 60 g/100 g, fat in solid should be minimum 45 g/100 g. Composition of cheese would be different because different condition in milk and fresh cheese, furthermore protein will be increased by using more of a coagulant, lower pH at curd drainage, probably by low scalding temperature, and more intensive milk pasteurization [9].

Comparison microbial contamination between plastic packaged and banana leaf packaged showed on Table 2. Result showed that microbial contamination on plastic packaged higher than banana leaf packaged a dangke. Banana leaf was famous as traditional packaged in Indonesia. Polyphenols activity on banana leaf could be inhibit a decomposition bacterial. Furthermore, microbial contamination would be influenced by content of water on dangke.

Table 2. Microbial Evaluation of dangke

Substrate	Most probable number (MPN) Coliform	Most probable number (MPN) E. coli
Fresh dangke	11 MPN/g	11 MPN/g
Dangke by packaging plastic	$2.4x10^9$ MPN/g	3 MPN/g
Dangke by packaging banana leaf	2×10^9 MPN/g	3 MPN/g

Based traditional practice of using banana leaf as food wrapping it is the most reliable as food and cuisine wrapping, these should be criteria to look for in other species or varieties of banana as potential wrapping [10]. Packaging configuration lulos packed (wood) with banana leaf is an easy alternative to get and preserve the quality of fruits for a longer storage time [11]. European commission regulation No. 2073 [12] determined that maximum threshold for *coliform* contamination was 3 log cfu/g. National Standard of Indonesia on microbial contamination limit and limit maximum residues in foodstuffs of animal origin, on this case raw material cheese is milk pasteurization, have criteria *Coliform, E. coli, S. aureus, Clostridium, Salmonella, Listeria* were lower 0.1×10^1, 0 unit, $1x\ 10^1$, 0 unit, and negative respectively [13]. Then, Indonesian standard for cheese (all variaties) 10/g MPN *E. coli*, negative/25 g salmonella, $1\ x10^2$ cfu/g *S. aureus*, *Listeria monocytogeneses* negative/25 g [14]. Most probable number of *E. coli* above Indonesian Standard of cheese and could be food poisoning. However, never found a patient case on hospital because microbial contamination on dangke. Served dangke by fried could be reduce decomposition and pathogenic bacteria.

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IV. CONCLUSION

Dangke was packaged by material banana leaf have potentially to reduce microbial contamination than plastic material on dangke product.

ACKNOWLEDGMENT

We would like to thank Islamic Boarding School AL Mawaddah Warrahmah Kolaka to support this research..

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AUTHORS PROFILE

Muhammad Askari Zakariah, a researcher from IAI AL Mawaddah Warrahmah Kolaka, his publication on feed and food technology.

Ratmawati Malaka, a Professor of Milk technology on Hasanuddin University.

Amran Laga, a Professor of Agroproduct technology on Hasanuddin University.

Ambo Ako, a Professor of Animal Production on Hasanuddin University.

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