National Journal of Physiology, Pharmacy and Pharmacology

SHORT COMMUNICATION

Innovation of dodol and stick milk and quality control of product based on microbial contaminant

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Received: August 04, 2017; **Accepted:** January 27, 2018

ABSTRACT

Background: Innovations of traditional food such as dodol and sticks are to improve the quality and sale value products. The innovation of dodol and sticks are one way to change the cow's milk to be food products. **Aims and Objectives:** This research purposes to give innovation of dodol and stick from cow's milk, then it be controlled of microbial contaminant. **Materials and Methods:** The innovation of this products makes dodol and stick products from cow milk. After that, the products are determined the bacterial growth using total plate count (TPC) and coliform test for controling the product. **Result:** The dodol and stick are made with addition the cow's milk to be a useful and good products. The production of dodol and stick milk has good taste, adorable products, and has high sale value. The quality control of products was determined from TPC number and coliform test. The dodol and stick products have TPC value are 0.1×10^4 colony-forming unit (CFU)/g and 0.3×10^4 CFU/g, respectively, which it was done after 15 days from production. Then, the number of coliform in the products is <3 most probable number/100 mL. The two parameters indicate that the products can be used and consumed for 15 days after production. **Conclusion:** Dodol and stick milk can be produced as traditional foods, and these products can be saved until 15 days.

KEY WORDS: Total Plate Count; Coliform; Dodol Milk; Stick Milk

INTRODUCTION

Milk is a source of protein. In addition to protein, milk has some essential content that is needed by the body. The chemical composition includes protein and fat in the milk of 3.43% and 4.28%.[1] According to Ayub *et al*.,[2] reported that milk has protein and fat content in of 3.5–3.8% and 6.98–7.35%. Milk also contains inorganic minerals. Inorganic mineral occurs in milk as inorganic ion and salt.[3] The high content of protein and fat encourages to make product diversification of milk dairy products. Kariuki *et al*.[4] reported that a diversification of dairy products to increase the product value rather than pure fresh milk (raw fresh milk).

Access this article online	
Website: www.njppp.com	Quick Response code
DOI: 10.5455/njppp.2018.8.0830027012018	

The product diversification of milk dairy cows can be created such as yogurt, bread, and cheese. This product diversification has the contribution of the informal sector in the growth and development of the country.[4] The product diversification is necessary to control the quality products. In general, product diversification can be tested the pathogenic bacteria count.[5] Bacterial contaminants in the milk product be used to test and control the product quality such as *Salmonella* spp., *Escherichia coli*, *Listeria monocytogenes*, and *Staphylococcus aureus*,[5,6] but it also

is testing Coliform[6] and total plate count (TPC) or total bacterial count.[7,8]

The quality products of dodol milk and stick milk are tested the bacterial count in product. The bacterial analysis in diversification of milk dairy product as dodol and sticks was observed ther coliform and TPC. For this reason, Doyle *et al*.[8] reported that the increase of bacteria count indicates the decrease of product quality. The processing of milk into dairy products as dodol and stick is an increase the sale value of milk and can make some good product. The cow's milk can be processed to refined products such as pasteurized milk, yogurt, bread, and cheese. Akweya *et al*.[9] reported that 18% of pasteurized milk demand in Garissa town and fermented products such as sour milk and yogurt demand in Garissa town by 31% and 20%. This result shows that the milk can be processed to product diversification as potential in the market.

MATERIALS AND METHODS

Preparation of Milk Dodol

600 mL of cow's milk is heated and stirred for 15–20 min until boiling (Formula 1). Then, 30 g tapioca flour and 100 g glutinous rice flour mixed in 400 mL of milk (Formula 2). Formula 2 is inserted into Formula 1 and added sugar while stirring. The batter is heated and stirred until the batter is not sticky. After that, put the batter to be wrapped. Then, dodol milk product is tested the TPC value and its coliform.

Preparation of Milk Stick

350 g wheat flour and 50 g maizena flour and salt were mixed until homogeneous. Then, 50 g butter and 1 egg were added and stirred. After that, it is made of sphere dough and it is flattened using pressing tool. The flat dough be cut lengthwise and fried until the color product has golden yellow. Then, stick product is tested the TPC value and coliform numbers.

RESULT

The milk was mixed into dodol and stick product given the good of product quality and good taste. The dodol and stick products [Figure 1] were produced with the method as shown in Figure 2.

The product was controlled and determined the bacterial contaminant. The result showed that the dodol and stick milk has good quality because it has not bacterial contaminant [Table 1].

DISCUSSION

In this study, product diversification was made as dodol and stick. The product is traditional food from Indonesia. According to Chuah *et al*.,[10] reported that dodol is a traditional food that is very potential to be commercialized and marketable. Therefore, this study developed dodol and sticks product with the addition of cow's milk in the product. The cow's milk has low fat and high protein that are needed by the human body. The other reason is that the milk can improve and give the taste and product quality [Figure 1]. The processing of dodol modifications was made by Malawat and Hidayah[11] which made the dodol by adding 5% concentration of brown sugar and cassava ratio at 80:20%. In addition, reference[12] about dodol modification with adding the stabilized rice bran with a concentration of 10–40% and it has resulted in increasing of the minerals, vitamins, and dietary fiber in the product. The fiber content was increased in dodol, because the fiber content in dodol is nothing. This is consistent with those reported by Chuah *et al*.,[10] who reported that traditional dodol has fiber content which is not traceable.

Figure 1 shows that the diversification product of dodol milk and sticks milk was produced. Dodol milk is made from a mixture of cow's milk, glutinous rice flour, tapioca flour, and sugar. Dodol was produced using two batters. The first batter containing cow's milk (42% of the total component) is heated, while second dough contains glutinous rice flour (1%), tapioca starch (7%), sugar (22%), and milk (28%). The manufacture process of stick milk has different in the material composition, type of material, and also the manufacturing process. The material composition for producing the sticks milk also contain corn starch (11%), wheat flour (78%), butter (11%), 1 egg, and salt to taste. Dodol milk and sticks milk were produced using the simple process [Figure 2]. Dodol milk and stick milk product have the opportunity to improve the sale value and potential product for business. The products diversification must be analyzed to give food safety and to control the product quality.

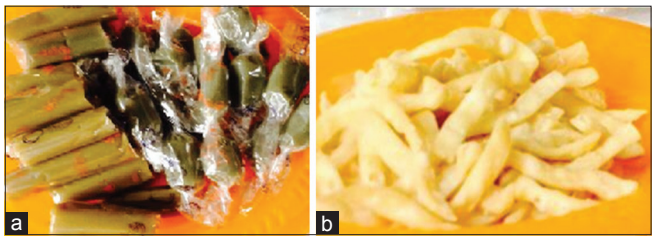

Figure 1: Product diversification of milk ingredients: (a) Dodo milk, (b) stick milk produced in Hargobinangun, Sleman, Yogyakarta, Indonesia

Table 1: Parameters of diversification of milk product from Hargobinangun, Sleman, Yogyakarta, Indonesia

Food product	Parameter of product quality	
	TPC (CFU/g)	Coliform test (MPN/100 mL)
Dodol milk	0.1×10^4	<3
Stick milk	0.3×10^4	<3

TPC: Total plate count, CFU: Colony-forming unit, MPN: Most probable number

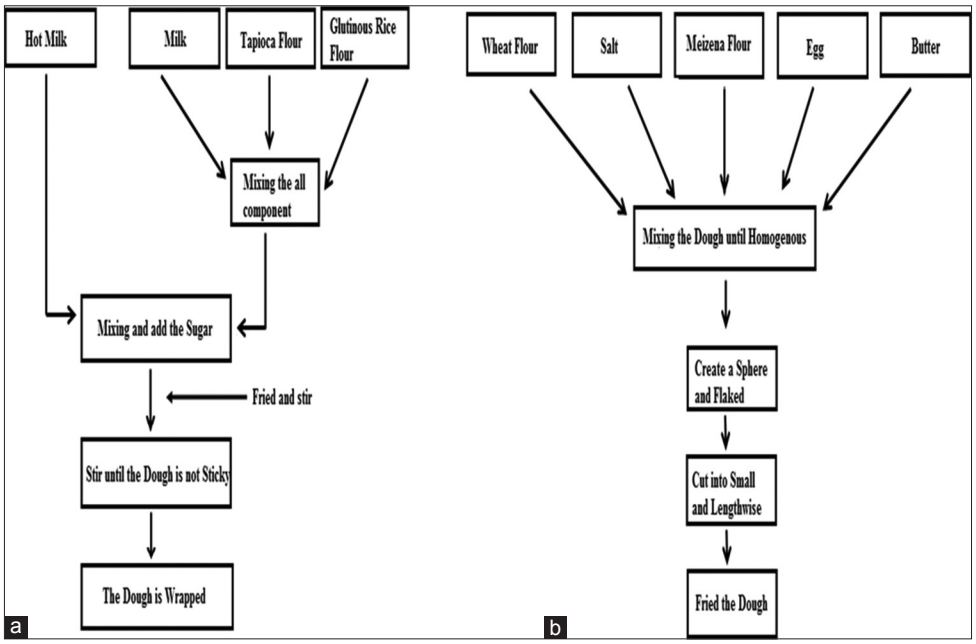

Figure 2: Diversification process from milk cow: (a) Dodol milk, (b) stick milk was produced from Hargobinangun, Sleman Yogyakarta, Indonesia

Analysis of product diversification such as dodol milk and stick milk was conducted by TPC and coliform test. The TPC is a quantitative analysis of bacterial contaminants in foods or beverages. This TPC cannot be used as indicators of food security because this test is a general analysis and there is no correlation with the presence of pathogens or reviews their toxins, but TPC can also be used as an indicator of quality in the appropriate context.[13] The number of microbes in a food product must be known because it has a minimum limit of microbial contaminants. Analysis of a number of microbes is used to determine risks to consumers and indicators of product quality.[14] TPC testing can be used as verification of the production process and the acceptance of a product. Besides TPC test, the coliform test is a method used to determine the number of bacteria such as the thermotolerant coliforms and bacteria of fecal origin, as well as some bacteria that may be isolated from environmental sources.[14,15] In general, *Escherichi*a, *Klebsiell*a, *Enterobacte*r, *Serrati*a, *Citrobacte*r were classified in coliform Bacili.[5,16] The presence of coliform bacteria indicates the poor of product quality and bad handling. Therefore, the TPC and coliform test can be used for analysis the final product and a product does not contain *E. coli*. The parameters are used in the first stage in product quality analysis so that the product is safe for consumption and marketable.

Results of microbial analysis on the quality of dodol milk and stick milk have a TPC value of 0.1×10^4 forming colonies unit (CFU)/g and 0.3×10^4 CFU/g [Table 1]. The result in this research showed that TPC value of dodol milk was lower than stick milk product. So, dodol milk and stick milk was categorized in safe food and acceptable food. This reason was reported by NSW Food Authority[17] that the food Grade A as good food has standard plate count $<10^4$ and acceptable food has standard plate count $<10^6$. According to reference,[18] they classify that the food with TPC value $<10^4$ is an acceptable food.

The analysis of product quality from dodol milk and sticks milk also showed So, dodol milk and stick milk was categorized in safe food and acceptable food. This result can be interpreted based on Table 2, which is the MPN interpretation of bacterial number in the product. Interpretation of coliform test was done in three types of concentration, i.e., 10, 1, and 0.1 mL. The MPN interpretation of bacterial number in a product can be viewed according to Table 2.

The interpretation from Table 2 is based on the results of the analysis of coliform from three different concentrations. It showed that dodol milk and sticks milk product do not indicated the presence of coliform bacteria contamination. According to Falomir *et al*.[20] also reported that the value of <3 coliforms/g as an indication that the presence of coliform bacteria under the detection limit. The results of this research reported that dodol milk and sticks milk can serve and be eaten food until 15 days after production.

CONCLUSION

According to Falomir *et al*.[20] also reported that the value of <3 coliforms/g as an indication that the presence of coliform bacteria under the detection limit. The TPC number from dodol milk and stick milk product is 0.1×10^4 CFU/g and 0.3×10^4 CFU/g, respectively. The result of this research has the coliform number of <3 MPN/100 mL.

Table 2: Interpretation the coliform test with the MPN using 3 tubes at a different concentration of 10, 1, and 0.1 mL (Laboratory Quality Assurance Staff [19])

Positive tubes (mL)			
10	**1**	**0.1**	**MPN/100 mL**
0	0	0	<3
0	0	1	3
0	2	0	6.2
0	1	0	3
0	1	1	6.1
1	0	0	3.6
1	0	1	7.2
1	1	0	7.3
1	1	1	11

MPN: Most probable number

ACKNOWLEDGMENTS

The author would like to thank who have helped, especially villagers, Hargobinangun, Sleman, Yogyakarta, on participation in making dodol milk and sticks milk product. Moreover, we would like to thank Higher Education of Indonesian (KEMENRISTEK DIKTI) which has provided grants in KKN PPM 2016.

REFERENCES

1. Gemechu T, Beyene F, Eshetu M. Physical and chemical quality of raw cow's milk produce and marketed in shashemene town, Southern Ethiopia. J Food Agric Sci 2015;5:7-13.
2. Ayub M, Ahmad Q, Abbas M, Qozi IM, Khattak IA. Composition and adulteration analysis of milk samples. Sarhad J Agric 2007;23:1127-30.
3. Zamberlin S, Antunac N, Havranek J, Samaržija D. Mineral elements in milk and dairy products. Mljekarstvo 2012;62:111-25.
4. Kariuki AN, Iravo MA, Kihoro JM. Value addition and performance of informal dairy enterprises in Kenya: A product diversification perspective. OSR J Bus Manag (IOSR-JBM) 2015;17:40-9.
5. Sheehan JJ. Milk quality and cheese diversification. Irish J Agric Food Res 2013;52:243-53.
6. Abbas MN, Khattak B, Sajid A, Islam TU, Jamal Q, Munir S. Biochemical and bacteriological analysis of cows' milk samples collected from district Peshawar. Int J Pharm Sci Rev Res 2013;21:221-6.
7. Tassew A, Saifu E. Microbial quality of raw cow's milk collected from farmers and dairy cooperatives in Bahir Dar Zuria and Mecha district, Ethiopia. Agric Biol J N Am 2011;2:29-33.
8. Doyle MM, Garcia S, Bahati E, Karamuzi D, Cullor JS, Nandi S. Microbiological analysis of raw milk in Rwanda. Afr J Food Sci Technol 2015;6:141-3.
9. Akweya BA, Gitao CG, Okoth MW. The acceptability of camel milk and milk products from north eastern province in some urban areas of Kenya. Afr J Food Sci 2012;6:465-73.
10. Chuah TG, Nisah HH, Choong SY, Chin NL, Sheikh AH. Effects of temperature on viscosity of dodol (concoction). J Food Eng 2007;80:423-30.
11. Malawat S, Hidayah I. The effects of the concentration of brown sugar and the comparison of cassava (*Dioscorea alata*) pasta proportion to the making of "dodol"(Indonesian food). IOSR J Agric Vet Sci 2013;6:9-15.
12. Rosiyana A, Hashifah MA, Norin SA. Nutritional composition and sensory evaluation of dodol formulated with different levels of stabilised rice bran. J Trop Agric Fd Sc 2010;38:171-8.
13. Tortorello ML. Indicator organisms for safety and quality—Uses and methods for detection: Minireview. J AOAC Int 2003;86:1208-17.
14. Mailoa MN, Sabahannur ST, Halid I. Analysis total microbial and detection of salmonella on smoked fish. Int J Sci Technol Res 2013;2:29-31.
15. Bartram J, Pedley S. Water Quality Monitoring - A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programmes. Geneva: Published on behalf of United Nations Environment Programme and the World Health Organization (UNEP/WHO); 1996.
16. Salman AM, Hamad IM. Enumeration and identification of coliform bacteria from raw milk in Khartoum State, Sudan. J Cell Anim Biol 2011;5:121-8.
17. NSW Food Authority. Microbiological Quality Guide for Ready-to-eat Foods "A Guide to Interpreting Microbiological Results. 6 Avenue of the Americas Newington: NSW Food Authority; 2009. p. 1-9
18. Gilbert RJ, Robert D, Bolton FJ, de Louvois J, Little C, Donovan T, *et al*. Guidelines for the microbiological quality of some ready-to-eat foods sampled at the point of sale. Commun Dis Public Health 2000;3:163-7.
19. Laboratory Quality Assurance Staff (LQAS). Laboratory Guidebook Notice of Change Most Probable Number Procedure and Tables. MLG Appendix 2.05; 2014. p. 1-8.
20. Falomir MP, Gozalbo D, Rico H. Coliform bacteria in fresh vegetables: From cultivated lands to consumers. In: Mendez-Villas A, editor. Current Research, Technology and Education Topics in Applied Microbiology and Microbial Biotechnology. Badajoz: Formatex; 2010. p. 1175-81.

How to cite this article: Ahda M, Maryani I, Jatmika SED. Innovation of dodol and stick milk and quality control of product based on microbial contaminant. Natl J Physiol Pharm Pharmacol 2018;8(5):767-770.

Source of Support: Nil, **Conflict of Interest:** None declared.