

Calculation Of Coliform Number Using Most Probable Number (MPN) Methods On Soy Milk Sold in Pogot Area Of Surabaya

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ABSTRACT

The quality of drinks is one of the problems that exist in society, especially because of bacterial contamination of drinks that often occurs in developing countries. One of them is soy milk drinks that are contaminated by bacteria including those sold by street vendors in the Pogot area of Surabaya. Based on the background description in this study can be formulated as follows: Is the number of Most Probable Number (MPN) Coliform in soy milk sold by street vendors in the Pogot area of Surabaya fulfill the Indonesian National Standard (SNI) 7388: 2009? The purpose of this study was to determine the amount of Coliform in soy milk sold by street vendors in the Pogot area of Surabaya compared to the Indonesian National Standard (SNI) 7388: 2009 regarding the maximum limit of microbial contamination in food. This study used a descriptive study design that soy milk sold by street vendors in the Pogot area of Surabaya was the population. Samples were used as many as 16 samples from 4 street vendors, each of which was taken 4 then laboratory-tested and analyzed using percentages. Based on the requirements of the Indonesian National Standard (SNI) 7388: 2009, the limit of contamination of the Most Probable Number (MPN) Coliform in soy milk is 20 / ml. Based on the results of the research of 4 soy milk traders there were 2 traders whose the results fulfilled the requirements of the Indonesian National Standard (SNI) and 2 traders whose the results didn't fulfill the requirements of the Indonesian National Standard (SNI). So 50% were eligible (MS) and 50% were not eligible (TMS).

Key words: *Coliform* Bacteria, Most Probable Number (MPN), Soy Milk.

INTRODUCTION

Soy milk is a product that is rich in vitamins and minerals, also very economical, lactose free, very easy to digest. Cholesterol-free soy milk with very low fat content and rich in phospholipid unsaturated fatty acids, especially lecithin and linolenic acid. Soy milk is one of the processing products which is the result of soybean extraction. Soy milk protein has an amino acid structure similar to cow's milk, so soy milk is often used as a place for cow's milk. In addition, soy milk also contains

fat, carbohydrates, phosphorus, iron, provitamin A, vitamin B complex except B12 (Singh, 2010).

Soy milk is a popular drink, until now it can be said that soy milk has quite a lot of enthusiasts and has started to spread to various marketing venues, ranging from city buses which are served modestly by only in plastic wrappers to supermarkets in more packaging. has a selling value such as in bottles, etc. (Anonim, 2012).

Soy milk can provide benefits for the health of the body and can also cause poisoning. A case of soy milk poisoning has occurred in elementary school children, quoted from JawaPos.com (Miftakhul, 2017). School snacks have claimed another victim. This time the victims were students of SDN Brodot 1, Bandar Kendungmulyo District, Jombang Regency. It is suspected that the soy milk they bought in front of the school caused 13 students to be poisoned, so they had to be rushed to the local Puskesmas for intensive care. It is suspected that the poisoning was caused by contamination of soy milk.

Field evidence is based on the Pracoyo survey in 2006, contamination by pathogenic bacteria in food and beverages often occurs, with a contamination level of 24 - 48%, including *Salmonella group E*, *Staphylococcus aureus*, *Pseudomonas sp.*, *E. Coli*, dan *Bacillus sp.*

Contamination of microorganisms in soy milk can be obtained from the use of tools in the manufacture of dirty processes, dirt around the processing container and the raw material itself which is not hygienic and dust or other factors that can cause contamination of the soy milk. . With this contamination, it causes damage to the quality of soy milk so that soy milk is not suitable for consumption by consumers (Helpida, 2013).

The higher the level of Coliform bacteria contamination, the higher the risk of the presence of other pathogenic bacteria that usually live in human and animal feces. One example of pathogenic bacteria that may be present in beverages contaminated with human and warm-blooded animal feces is *E. Coli*, a

microbe that causes symptoms of diarrhea, fever, stomach cramps and vomiting (Entjang, 2003).

Escherichia coli bacteria are included in the *Coliform* group, this type of bacteria is used as an indicator organism for food and drink contaminated by human and animal feces because it is easy to see in a simple way. The discovery of *E. coli* does not mean that there are pathogens in the water. *Coliform* is a group of bacteria that is used as an indicator of dirt pollution and bad conditions for water, food and milk drinks. The presence of *Coliform* bacteria in food or beverages supports the possibility of microbes that are enteropathogenic and toxic which are harmful to health. The *Coliform* genus includes: *Serratia*, *Hafnia*, *Citrobacter*, *Enterobacter*, *Klebsiella*, dan *E. coli* (Pelczar and Chan, 2005).

Coliform bacteria were found in food and beverages, it has not been confirmed that there was contamination by pathogenic bacteria, but if the number of *Coliform* bacteria exceeds the maximum limit of contamination in food, it can cause various diseases.

According to the Standard National Indonesian (SNI) 7388: 2009 the limit of the Most Probable Number (MPN) Coliform in soy milk is 20 / ml. Based on the description above, it encourages the author to take the title of research on calculating the amount of Coliform using the Most Probable Number (MPN) method on soy milk sold by street vendors in the Pogot area of Surabaya.

METHODS

This study used a descriptive research design to obtain an objective picture of the amount of Coliform using the MOST PROBABLE NUMBER (MPN) method on soy milk sold by street vendors in the Pogot area of Surabaya. The study population was soy milk sold by

street vendors in the Pogot area of Surabaya. The sample used was soy milk sold by street vendors in the Pogot area of Surabaya, as many as 16 samples from 4 street vendors, each of which was 4.

RESULTS

Based on the Coliform examination with the Most Probable Number (MPN) method on 16 samples of soy milk from 4 street vendors in the

Pogot area of Surabaya, 4 samples each were taken, the results were shown in Table 4.1 as follows:

Table 1. Examination Results of Presumptive Tests and Confirmative Tests of Most Probable Number (MPN) Coliform From 16 Soy Milk Samples.

No	Sample Code	Test <i>Presumtif</i> LB			Result	Test <i>Confirmatif</i> BGLB			Result MPN Index	Result Average MPN	Qualified	Unqualified
		5 x 10 ml	1 x 1 ml	1 x 0.1 ml		5 x 10 ml	1 x 1 ml	1 x 0.1 ml				
1.	A1	5+	1+	1+	+	0	0	1+	2	11,8	√	
2.	A2	5+	1+	1+	+	1+	0	0	2,2			
3.	A3	5+	1+	1+	+	3+	1+	1+	16			
4.	A4	5+	1+	1+	+	4+	1+	1+	27			
5.	B1	5+	1+	0	+	4+	1+	0	21	16,7	√	
6.	B2	5+	0	0	+	3+	0	0	8,8			
7.	B3	5+	1+	1+	+	4+	1+	1+	27			
8.	B4	5+	1+	1+	+	2+	1+	1+	10			
9.	C1	5+	1+	0	+	3+	1+	0	12	20,25		√
10.	C2	5+	1+	0	+	4+	1+	0	21			
11.	C3	5+	1+	1+	+	4+	1+	0	21			
12.	C4	5+	1+	1+	+	4+	1+	1+	27			
13.	D1	5+	1+	1+	+	5+	1+	0+	240	≥ 240		√

After carrying out the presumptive test (estimated) incubated at 37 °C for 1 X 24 hours, a positive result (+) was obtained which was then continued on the Confirmative test (confirmation) Most Probable Number (MPN) Coliform.

In the results of the Most Probable Number (MPN) Coliform that meets the requirements and does not meet the requirements of the Indonesian National Standard (SNI) 20 / ml Number: 7388 of 2009, the results are shown in Table 2 as follows:

Table 2. Most Probable Number (MPN) Coliform Examination Results that meet the requirements and do not meet the requirements of the Standard National Indonesian (SNI) 20/ml Number: 7388 of 2009.

No	Sample Code	Result MPN Index	Result Average	Qualified	Unqualified
1.	A1	2	11,8	√	
2.	A2	2,2			
3.	A3	16			
4.	A4	27			
5.	B1	21	16,7	√	
6.	B2	8,8			
7.	B3	27			
8.	B4	10			
9.	C1	12	20,25		√
10.	C2	21			
11.	C3	21			
12.	C4	27			
13.	D1	240	≥ 240		√
14.	D2	≥ 240			
15.	D3	≥ 240			
16.	D4	≥ 240			

Information:

Q : Qualified

NQ : Unqualified

LB : Lactose Broth

BGLB : Brilliant Green Lactose Broth

From the results of the above research, the results of the examination of the Most Probable Number (MPN) Coliform in the sample are

presented in the form of a percentage obtained can be shown in Table 2. as follows:

Table 2. Results of Frequency and Percentage that Meet the Requirements and Not Meet the Requirements in the Inspection of the Most Probable Number (MPN) Coliform Standard National Indonesia (SNI) 20/ml Number:7388 of 2009.

Explanation	Q	%	NQ	%
Soy Milk	2	50	2	50

Of the 16 samples, each sample was taken 4 soy milk samples obtained from 4 street vendors, the results obtained were samples that met the requirements and samples that did not meet the

requirements of the Indonesian National Standard (SNI) Number 7388 of 2009, the Most Probable Number (MPN) contamination limit. Coliform in soy milk is 20/ml.

DISCUSSION

According to the requirements of the Standard National Indonesian (SNI) Number 7388 of 2009, the most probable number (MPN) coliform contamination limit in soy milk is 20/ml. The Presumptive and Confirmative Results of the Most Probable Number (MPN) Coliform examination on soy milk of street vendors in the Pogot area are presented in table 4.1, then the results of the Most Probable Number (MPN) table are in table 2. Based on

the research in terms of bacteriology, it shows that 50% meet the requirements and 50% do not meet the requirements. Of the 16 samples of soy milk sold by 4 street vendors in the Pogot area of Surabaya, after the results from the MPN table are averaged, there are 2 samples that meet the requirements (MS) and 2 samples that do not meet the requirements (TMS) of the Indonesian National Standard (SNI) Number 7388 of 2009. In previous studies in different

locations also revealed about the sanitation hygiene of milk processing with the E. Coli bacterial test, which was branded as a result of 10 samples, there was 1 sample that did not meet the requirements or contained Coliform bacteria that exceeded the normal threshold. but negative for E. Coli (Deni, 2012).

The presence of Coliform bacteria in food and beverages indicates the possibility of microbes that are enteropathogenic or toxinogenic which are harmful to health. Coliform bacteria are divided into two groups, namely faecal Coliforms derived from animal or human feces, namely *Escherichia coli* and non-faecal Coliforms, namely *Enterobacter aerogenosa* which are usually found in dead animals and plants (Widiyanti et al, 2004). The high number of Coliform bacteria in soy milk can be influenced by many factors, such as contamination from the basic ingredients of making soy milk, water used, soy milk making tools, and environmental factors of sale. This factor can be a factor for the entry of bacteria (Buckle, et al. 2009).

Based on the research, it was conducted by using the presumptive test (estimator) first, where the presumptive test (estimator) was carried out using Lactosa Broth (LB) media and used seven test tubes in each sample. In a test tube containing Lactose Broth (LB) media, a durham tube is inserted upside down as a storage place for gas produced by bacterial metabolism. Lactose Broth (LB) filled with samples was then incubated at 37⁰C for 1 X 24 hours. The Lactose Broth (LB) medium in the soy milk sample, which was previously clear yellow after incubation, turned cloudy and there were bubbles in the durham tube. Based on the

observations it can be said that the soy milk sample contains Coliform. According to Marsela (2015), Coliform is a gram-negative bacteria capable of fermenting lactose. This is what makes the media cloudy but also due to the formation of acids and gases in the durham tube. After the positive sample prediction test is carried out, it will be tested again at the next stage, namely the Confirmative test (confirmation) where the aim is to obtain more specific data regarding the type of Coliform contained therein. Confirmative test (affirmation) was carried out with Brothian Green Lactose Broth (BGLB) media with the same method in the prediction test. The BGLB media in soy milk samples obtained negative results. This could be because the bacteria that ferment lactose are not Coliform bacteria. This finding is almost the same as the previous study, but with different objects in Bungus District, Padang in 2012. In this study, one sample showed an MPN index > 1100, but the other sample showed an MPN index that matched the bacteriological requirements.

Factors that influence the results of this study are the presence of a turbidity factor in the soy milk sample so that during the presumptive test the sample in soy milk is too cloudy so it can be concluded that the soy milk sample is not a coliform germ and does not break down lactose so that it the confirmative test (confirmation) did not produce coliform germs therefore the results of the confirmative test (confirmation) were negative.

This research shows that the factors that can influence the basic ingredients of soybeans are the possibility of making soy milk water using PDAM water, the manufacturing process still

using simple equipment, and the environment that is not far from around rivers and roads that are heavily polluted. In addition, there are several factors that influence soy milk, such as the use of bottles of soy milk that are used repeatedly and places where soy milk ingredients are often open so that dust, dirt, and

CONCLUSION

Based on the research results of 4 soy milk traders, there are 2 traders whose results meet the Indonesian National Standard (SNI) and 2 traders whose results do not meet the

pollution can enter and are likely to be contaminated. The discovery of Coliform bacteria in food and beverages does not necessarily cause disease, but if the number of bacteria exceeds the maximum limit, it is feared that other bacteria that are pathogenic in these materials can cause health problems.

Indonesian National Standard (SNI) requirements. So 50% Eligible (MS) and 50% Unqualified (TMS).

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