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Detecting Coliform on Fresh Milk in Jatinangor, Sumedang Regency, West Java

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Abstract. The research aimed to determine the amount of coliform on the fresh milk in Jatinangor, Sumedang Regency, West Java – Indonesia. The object of this research are three traditional dairy farming; and the experimental are repeated 6 times, including morning and afternoon milking, it makes 36 total samples of fresh milk in total. The result showed coliform have exceed the maximum limit of microbial contamination (more than 13×10^1 MPN/ml). According to Indonesia National Standard (SNI) in 2011, the maximum requirement of total coliform on fresh milk is 2×10^1 MPN/ml[1]. This implies that the fresh milk quality is not good because of sanitation and hygiene problem, one possible reasons is the distance between water source and farm is relatively near.

Keywords: californ, fresh milk,

1. Introduction

Food hygiene is the important factor because it relate to individual health. The rise of population increases food needs; thus, it is important to guarantee food hygiene, in particular dairy products. Contamination problem, includes chemical, physical, and biological contamination in particular pathogen bacterial. Dairy products that are not well processed could be a source of contaminant. Milk quality could decrease because of microbial, with some signs: different of taste, color, smell, consistency and shelf life.

Coliform are found in dairy product causing diarrhea[2]. The higher contamination of coliform can cause growing pathogenic bacterial. increases the risk of the other pathogen bacterial appearance. On the other side, a good sanitation condition can be achieved by maintaining environment, equipment, and farm conditions as well as livestock health. Even though the farms have a good sanitation, it does not mean free from bacterial.

The object of this research is three dairy farms in Jatinangor, Kabupaten Sumedang. The milking is usually conducted two times a day, in the morning and afternoon. The sanitation condition in those farms is good enough because the farmers already have good knowledge on the important of cleanliness and milk processing, such as washing hands with soap, cleaning cow' nipples before milking process, and cleaning all the equipment.

Meanwhile, the government of Indonesia sets Indonesia Standard National (SNI) of fresh milk by microbiological testing to examine the quality of dairy products. Yet, the farmers have not followed operational standard of work that required, for example: the farmers do not separate the equipment that used for milking process and further process, they also do not have good layout and circulation of farm.



2. Experimental Procedure

The research was conducted on March 2018, in the laboratory of microbiology and livestock waste handling, animal husbandry faculty, the University of Padjadjaran, Kecamatan Jatinangor, Kabupaten Sumedang, Indonesia. The research object is the number of coliform in fresh milk from three dairy farms in Jatinangor. The research method is experimental method using one tail t-test and two non-parametric statistics tests i.e.: Kruskal-Wallis test and Mann-Whitney test. Moreover, presumptive test is used in this research to examine the amount of coliform (Figure 1).



Figure 1. Positive coliform on Fresh Milk. Positive reaction is marked by the appearance of gas in a Durham tube and cloudy in a liquid medium.

3. Results and discussions

The average number of coliforms in fresh milk from three dairy-farms in Jatinangor Indonesia. The experiment uses presumptive test. The aim is to examine acid and gas because of lactose fermentation. The result from 36 samples using Most Probable Number (MPN) method is as showed in Table 1. The result shows sanitation and hygiene of dairy-farms are not good enough because t-test result shows higher values than t Table. As [3] asserts that fresh milk could contain micro-bacterial that exceed the number that allowed by SNI. Moreover, low quality of fresh milk occurs because of two factors: livestock quality and surrounding environment (such as: environment, farmers and equipment used).

The next test is confirmed test. If the result shows there is green metallic colony, implies there is fecal coliform. Meanwhile pink color implies there is non-fecal coliform. The result of experiment in three farms as showed in Table 2. Most of experiments show fecal coliform appears in those farms. The average amount of coliform in three farms in Jatinangor are: farm A 14.87×10^1 MPN/ml, farm B 13.15×10^1 MPN/ml, and farm C 14.39×10^1 MPN/ml. However, it need further examination by comparing the number of fecal and non-fecal coliform using Kruskal-Wallis test.

Table 1. The average MPN/ml of fresh milk.

Experiment No	Farm		
	A	B	C
 X 10 ⁻¹ MPN/ml		
1.	9.2	3.5	16
2.	16	9.2	16
3.	16	16	9.2
4.	16	16	16
5.	16	16	16
6.	16	16	16
7.	16	1.1	3.5
8.	16	16	16
9.	9.2	16	16
10.	16	16	16
11.	16	16	16
12.	16	16	16
Total	178.4	157.8	172.7
Average	1.87	13.15	14.39
Standard Deviation	2.657	5.453	3.948
Variation Coefficient (%)	17.87	41.47	27.44
t-test	29.17	12.27	18.83
t Table	1.796		

Table 2: Qualitative result of fecal and non-fecal of coliform bacterial.

Experiment no.	Farm								
	A			B			C		
	10	1	0,1	10	1	0,1	10	1	0,1
1.	F++	F+/NF	F/NF+	F/NF+	NF++	NF++	F/NF+	F++	F++
2.	F++	F+/NF	F+/NF	F/NF+	F++	F++	F+/NF	F/NF+	F+/NF
3.	F++	F+/NF	F+/NF	F+/NF	F+/NF	F++	F+/NF	F+/NF	F+/NF
4.	F+/NF	F+/NF	F/NF+	F++	F+/NF	F+/NF	F/NF+	F/NF+	F+/NF
5.	F+/NF	F/NF+	NF++	F++	NF++	F++	F/NF+	F/NF+	F+/NF
6.	F+/NF	F+/NF	F++	F+/NF	F+/NF	F+/NF	F/NF+	F+/NF	F+/NF
7.	F++	F+/NF	F/NF+	F+/NF	F/NF+	F+/NF	F/NF+	NF++	F/NF+
8.	F++	F+/NF	F++	F+/NF	F+/NF	F+/NF	F+/NF	F/NF+	F+/NF
9.	F++	F++	F++	F+/NF	F/NF+	F+/NF	F+/NF	F++	F+/NF
10.	F++	F+/NF	F+/NF	F+/NF	F+/NF	F+/NF	F+/NF	F++	F/NF+
11.	F/NF+	F++	F+/NF	F+/NF	F++	F+/NF	F++	F+/NF	F++
12.	F++	F++	F++	F++	F++	F+/NF	F+/NF	F/NF+	F+/NF

Notes:

3 = F++ : excessive (metallic green),

2 = F+/NF : fairly excessive (more green; less pink),

1 = F/NF+ : less excessive (less green, more pink),

0 = NF++ : not contain (pink).

Table 3 shows the result of Kruskal-Wallis test, Asymp. Sig value is 0.04, which is lower than P-value (0.05); thus, we reject H0 implies there is the difference amount between fecal and non-fecal coliform. Or in other words, the amount of fecal coliform is higher than the amount non-fecal.

Table 3. Kruskal-Wallis test.

Farm	
Kruskal-Wallis Value (Chi-Square)	6.424
Degree of Freedom (df)	2
Asymp. Sig.	0.040

Notes: H0: there is no significant different between fecal and non-fecal coliform.

Because the result shows there is a significant different, this research need further test i.e.: Mann-Whitney test. The aim is to compare which farms that contain very excessive and less excessive coliform. The result of Mann-Whitney test is shown in Table 4. Farms A and B do not have significant different of number of coliform because p-value (0.194) is higher than 0.05. Meanwhile farm A and C have different number of coliform because p value is less than 0.05. And farm B and C do not have different number of coliform, since p value is higher than 0.05.

Table 4. Comparison number of coliform in three farms.

Farm	Asymp. Sig.
A – B	0.194
A - C	0.014
B - C	0.184

Notes: *different symbol implies there is significant different between number of coliform.

4. Conclusions

The average amount of coliform in three farms in Jatinangor are: farm A 14.87×10^1 MPN/ml, farm B 13.15×10^1 MPN/ml, and farm C 14.39×10^1 MPN/ml. Those number in three farms exceeds the number that required by SNI in 2011 (2×10^1 MPN/ml). This research finding implies that the fresh milk quality is not good because of sanitation and hygiene problem. Although those three farms are relatively clean, the farmers clean up after milking process regularly, the problem still occurs, one possible reasons is the distance between water source and farm is relatively near, causes milk can be contaminate by other factors[4]. In additions, asserts the farms must be clean from fesses and urine which can cause the appearance of coliform bacterial[5].

5. References

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