

THESIS

**MOST PROBABLE NUMBER of *Escherichia coli*
DERIVED FROM MEATBALLS SOLD
AT MULYOREJO DISTRICT OF SURABAYA CITY**



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IR- PERPUSTAKAAN UNIVERSITAS AIRLANGGA

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Thesis

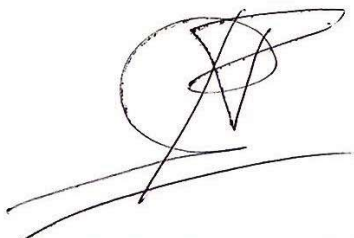
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DECLARATION

Hereby, I declare that the thesis entitled:

**Most Probable Number of *Escherichia coli*
Derived from Meatballs Sold
at Mulyorejo District of Surabaya City**

There is no other work ever published before to obtain a college degree in a certain college and to my knowledge there is also no work or opinion ever written or published by others, except those in writing referred to this paper and mentioned in the references.

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Dean,

The image shows a blue circular official stamp of Universitas Airlangga, Faculty of Veterinary Medicine. Overlaid on the stamp is a handwritten signature in black ink, which appears to be 'Prof. Dr. Mirni Lamid'.

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SUMMARY

Snack food is widely consumed by school children and the wider community in Indonesia. One of the snack foods is meatball which is extremely loved by various groups and ages because of its affordable price and delicious taste. Meatball with unknown quality can cause foodborne disease. One of the causes of foodborne disease is *Escherichia coli*. Pathogenic *Escherichia coli* causes a serious problem in human's health such as UTI, meningitis and gastroenteritis.

Meatball is a snack food made from meat and flour and then boiled and usually served with the sauce. Unhygienic meatball processing, from dough-making process to the serving method creates the potential for bacterial contamination particularly *Escherichia coli*. Hence, it is necessary to conduct the research related to *Escherichia coli* contamination in meatballs sold at Mulyorejo District of Surabaya City.

This research was conducted from July to August 2022 at the Bacteriology and Mycology Laboratory, Faculty of Veterinary Medicine, Universitas Airlangga. Samples were taken from Mulyorejo District of Surabaya City by purposive sampling method. The number of samples were 36. Two samples were taken from 18 vendors. This study uses the MPN method and data analysis is presented descriptively in the form of graphs and tables. This study aims to determine whether there is *Escherichia coli* contamination in meatballs sold at Mulyorejo District of Surabaya City and to determine the amount of MPN *Escherichia coli* in meatballs sold at Mulyorejo District of Surabaya City and its suitability with SNI (<3/gr MPN).

The results show that 20 out of 36 meatball samples were found contaminated with *Escherichia coli*. The results also show that 20 out of 36 meatball samples were exceeding the limit of MPN *Escherichia coli* based on SNI 7388-2009. The highest amount of MPN *Escherichia coli* is >1100 MPN/gr and the lowest is 0 MPN/gr. Contamination of *Escherichia coli* in meatballs caused by several factors such as poor serving practices, poor sanitation, polluted environment, vendor hygiene, unhygienic equipment and contaminated sauces.

From these results it can be concluded that 20 out of 36 samples (55,5%) were contaminated with *Escherichia coli* and all of that 20 samples (55,5%) were found exceeding the limit of MPN *Escherichia coli* contamination according to Indonesian National Standard (SNI) 7388-2009.

The suggestions put forward are it is necessary to educate meatball vendors in Mulyorejo District of Surabaya City about the proper processing methods to the proper serving method to prevent *Escherichia coli* contamination and also to support the Good Manufacturing Practices (GMP) and Hazard Analysis Critical Control Point (HACCP) programs. In addition, personal education of food safety is also necessary for consumers who consume meatballs sold at Mulyorejo District of Surabaya City. In the future, it is necessary to conduct further research to detect specific contamination between *Escherichia coli* in meatballs and *Escherichia coli* in meatball's sauce using MPN method.

**MOST PROBABLE NUMBER OF *Escherichia coli*
DERIVED FROM MEATBALLS
SOLD AT MULYOREJO DISTRICT OF SURABAYA CITY**

Daffa Amalia Putri

ABSTRACT

Snack food is widely consumed by school children and the wider community in Indonesia. One of the snack foods is meatball which is extremely loved by various groups and ages because of its affordable price and delicious taste. Meatballs with unknown quality can cause foodborne disease. One of the causes of foodborne disease is *Escherichia coli*. Pathogenic *Escherichia coli* causes a serious problem in human's health such as UTI, meningitis and gastroenteritis. This study aims to know the presence of *Escherichia coli* contamination in meatballs sold at Mulyorejo District of Surabaya City and also to know Most Probable Number (MPN) of *Escherichia coli* in meatballs sold in Mulyorejo District of Surabaya City and its suitability with SNI. Thirty six samples were taken from eighteen street vendors in Mulyorejo District of Surabaya City within eight weeks. Most Probable Number was used for the enumeration method. The results show that 20 out of 36 samples (55,5%) were contaminated with *Escherichia coli* and all of that 20 samples (55,5%) were found exceeding the limit of MPN *Escherichia coli* contamination based on Indonesian National Standard (SNI) 7388-2009. The presence of *Escherichia coli* exceeding the limit of SNI in meatballs sold at Mulyorejo District of Surabaya City indicate a lack of food safety. Hence, the proper hygiene sanitary method, food handling and food serving of meatballs sold at Mulyorejo District of Surabaya City is absolutely necessary.

Keywords : Meatballs, *Escherichia coli*, Most Probable Number, Snack food

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Surabaya, 26th of December 2022

Author

TABLE OF CONTENTS

FRONT COVER PAGE.....	
TITLE PAGE.....	i
DECLARATION.....	ii
IDENTITY.....	iii
SUMMARY.....	v
ABSTRACT.....	vii
ACKNOWLEDGEMENTS.....	viii
TABLE OF CONTENTS.....	x
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF APPENDICES.....	xiv
ABBREVIATIONS AND SYMBOLS.....	xv
 CHAPTER 1 INTRODUCTION	 1
1.1 Research Background.....	1
1.2 Formulation of the problem.....	4
1.3 Theoretical Base.....	4
1.4 Research Aim	6
1.5 Research Benefit.....	6
 CHAPTER 2 LITERATURE REVIEW.....	 7
2. 1 Meatballs.....	7
2.1.1 General Definiton.....	7
2.1.2 Meatballs Ingredients.....	8
2. 2 Foodborne diseases.....	10
2. 3 <i>Escherichia coli</i>	12
2.2.1. Characteristic of <i>Escherichia coli</i>	12
2.2.2. Types of <i>Escherichia coli</i>	15
2.2.3. <i>Escherichia coli</i> Contamination in Meatball.....	18
2. 4 MPN (Most Probable Number).....	21
2.4.1 Presumptive Test.....	23
2.4.2 Confirmed Test.....	24
2.4.3 Completed Test.....	24
 CHAPTER 3 MATERIALS AND METHODS.....	 26
3. 1 Research Plan.....	26
3. 2 Sample and Sample Size.. ..	26
3.2.1 Sample.....	26

3.2.2 Sample Size.....	26
3. 3 Research Variable.....	28
3.3.1 Independent Variable.....	28
3.3.2 Dependent Variable.....	28
3. 4 Variable Operational Definition.....	28
3. 5 Research Location and Time.....	28
3. 6 Research Materials and Equipment.....	29
3.6.1 Research Materials.....	29
3.6.2 Research Equipments.....	29
3. 7 Research procedure.....	29
3.7.1 Sample Preparation.....	30
3.7.2 Sample Dilution.....	30
3.7.3 Sample Inoculation.....	30
3.7.4 IMViC Test.....	31
3.7.5 MPN <i>Escherichia coli</i> Calculation	32
3. 8 Data Presentation.....	32
3. 9 Research Diagram.....	33
CHAPTER 4 RESEARCH RESULT.....	34
CHAPTER 5 DISCUSSION.....	40
CHAPTER 6 CONCLUSION AND SUGGESTION.....	45
6. 1 Conclusion.....	45
6. 2 Suggestion.....	45
REFERENCES.....	46
APPENDIX.....	59

LIST OF TABLES

Table	Pages
2. 1 Classification of diarrheagenic <i>Escherichia coli</i>	17
3.3 Meatballs Sampling Method.....	27
4. 1 MPN <i>Escherichia coli</i> results from 36 meatball samples.....	35

LIST OF FIGURES

Figure	Pages
2. 1 Stages of Meatballs Processing.....	8
2. 2 Cause of foodborne diseases.....	11
2. 3 Under a high magnification of 6836X,digitally-colored, Scanning electron microscopic image of the strain O157:H7	12
2. 4 Transmission Process of STEC.....	19
2. 5 The Procedure of Most Probable Number Method.....	25
4. 1 Graph of MPN <i>Escherichia coli</i> in each meatball sample sold in Mulyorejo District of Surabaya City.....	36
4. 2 Growth of fecal <i>Coliforms</i> on BGLB media (left side).....	37
4. 3 Growth of <i>Escherichia coli</i> bacteria on EMBA media.....	37
4. 4 Red ring formation on positive indole (left) and the absence of a red ring on negative indole (right).....	38
4. 5 Positive MR result (left) and negative MR result (right).....	38
4. 6 Positive VP test result (left) and negative VP result (right).....	39
4. 7 Positive citrate test result (left) and negative citrate result (right).....	39

LIST OF APPENDICES

Appendix	Pages
1. Mc Crady table of 3-tube series.....	59
2. Maximum Limit for Microbial Contamination in Food Based on SNI 7338:2009.....	60
3. IMViC Test Result of <i>Escherichia coli</i>	61
4. Table of MPN Fecal <i>Coliform</i> results from 18 vendors.....	62
5. Table of BGLB, EMBA dan IMViC test results of 36 meatball samples.....	63
6. Research Documentation.....	70

ABBREVIATIONS AND SYMBOLS

BGLB	= Brilliant Green Lactose Broth
BPW	= Buffered Peptone Water
BSN	= Badan Standarisasi Nasional
EMBA	= Eosin Methylene Blue Agar
EAEC	= Enteroagregative <i>Escherichia coli</i>
EIEC	= Enteroinvasive <i>Escherichia coli</i>
EPEC	= Enteropathogenic <i>Escherichia coli</i>
ETEC	= Enterotoxigenic <i>Escherichia coli</i>
FDA	= Food and Drugs Administration
IMViC	= Indole, Methyl Red, Voges-Proskauer, Citrate test
LST	= Lauryl Tryptose
MPN	= Most Probable Number
MR	= Methyl Red
pH	= Power of Hydrogen
SCA	= Simmons Citrate Agar
SEA	= <i>Staphylococcal</i> Enterotoxin A
SEB	= <i>Staphylococcal</i> Enterotoxin B
SEC	= <i>Staphylococcal</i> Enterotoxin C
SED	= <i>Staphylococcal</i> Enterotoxin D
SEE	= <i>Staphylococcal</i> Enterotoxin E
SEG	= <i>Staphylococcal</i> Enterotoxin G
SEH	= <i>Staphylococcal</i> Enterotoxin H

SEI	= <i>Staphylococcal</i> Enterotoxin I
SEJ	= <i>Staphylococcal</i> Enterotoxin J
SIM	= Sulfide Indole Motility
STEC	= Shiga Toxin-like producing <i>Escherichia coli</i>
SNI	= Standar Nasional Indonesia
USDA	= United States Department of Agriculture
UTI	= Urinary Tract Infection
VP	= <i>Voges Proskauer</i>
LST	= Laurly Sulfate Tryptose