THE TEST OF BACTERIAL CONTAMINATION ON MEATBALL PRODUCTS IN THE TRADITIONAL MARKET OF MARISA, POHUWATO

Asnita Kamumu[1], Rita Amini Warastuti[2], and Agusrianto Yusuf[3]
[1,2,3] Bina Mandiri University of Gorontalo
E-mail: nitajelita208@gmail.com

ABSTRACT

Meatball is one of Indonesia's typical meat-based products. It is usually served at a high temperature, moreover, it contains high nutrient due to the high animal nutrient that is necessary for human growth. The current study aims to determine the test of bacterial contamination on meatball that are sold in the traditional market of Marisa, district of Pohuwato. Five meatball samples were taken from five different vendors, and the sample testing was done in the laboratory of the faculty of science, technology, and health on July 13th, 2020. The test included the total plate count microbial pathogens contamination and E. coli bacteria in the meatballs.

The data were analyzed descriptively and presented in a tabular to illustrate the total plate count of pathogen contamination and E. coli bacteria in the meatballs. According to SNI 01-3818-1995, the maximum total plate count (ALT) of colonies/g is $0.1x10^2$, and for the E. coli bacteria, the AMP/g is <3.0.

As the results. It shows that the total microbes on the meatballs in the traditional markets of Marisa is ranged between $4.5x10^4$ colonies/g to $2.3x10^5$ colonies/g. It also shows that the meatballs still meet the requirement for the counts of microbial colonies, while the most probable number (AMP) of coliform bacteria is still high.

Keywords: coliform, bacteria total plate count (alt), meatballs.

INTRODUCTION

The food is a basic human need and as a source of energy to carry out physical and biological activities in everyday life. The food consumed by the body must be healthy in the sense that it has optimal and complete nutritional value. Besides, the food eaten must be pure, clean and intact in the sense that it does not contain contaminants and must meet the hygiene and sanitation requirements [18]

Furthermore, related to functioning to eliminate hunger, the food is also the main source of energy. Nutrients in food are needed by the body to carry out its functions, namely to produce energy, maintain tissues, and regulate life processes. [2] The nutrients needed by the body include carbohydrates, fats and proteins [13]

Protein is one of the most important nutrients for the body because its role is as a building block and regulates cells. Protein can also serve as a source of energy if carbohydrates and fats are no longer available. Protein is generally divided into animal protein and vegetable protein. The animal protein has a feature when compared to vegetable protein, because animal protein is more complex in its amino acid composition [1] One of the good animal proteins can be found in meat.

Meat is one of the livestock products that can be processed using various processing techniques. Apart from its high protein content, it also has high quality. Protein quality can be seen from the composition of the constituent amino acids and protein digestibility which determines the availability of amino acids biologically [1] Meat can be processed by cooking, frying, grilling, satay, smoked or processed into products such as sausages, shredded and meatballs.

Meatballs are a type of food in the form of balls made of meat and flour. This food is usually served with soup and noodles. Meatballs are processed meat that is in great demand by the wider community.

The high level of meatball consumption is due to the nutritional value contained in the meat more than other food ingredients. Given the high demand for meatballs, this encourages people to produce homemade meatballs for sale. Food that is consumed by consumers must be guaranteed its safety, so there is a need for standardization, including standardization for meatballs.

This is because meatballs are the most popular food for consumers. The aspects of safety food that must be considered in the process of producing ready-to-eat food in order for good production are prevention from biological contamination. The biological contaminants in question are those that can harm and disturb and can endanger health. This is based on article 9 PP No. 28 of 2004.

Processed meat products such as meatballs must meet the quality requirements that have been set. The community has the right to receive protection from unsafe and unhealthy food, so that the food safety aspect must be paid attention to, especially food safety in meatball products, where meatball products must not contain unhealthy ingredients and can endanger health such as microorganisms.

Microorganisms can contaminate food through the tools used, water, air, workers, processing and serving. The quality or quality of foodstuffs will decline and be damaged if there is contamination by microbes [3].

In addition, a decrease in volume and weight in food, a decrease in nutritional value, changes in the composition and form of compounds and will produce toxic substances that endanger health if contamination occurs by bacteria [16]

Furthermore, [8] explained that the organoleptic character would change if there were too many microbes found in foodstuffs or too high.

In addition, if it is too high it will change the nutritional value so that it can damage the food. If the food contains pathogenic microbes, it will likely cause poisoning to people who consume it. This is because the content of harmful microorganisms in these foods is detected by the human senses [10].

According to SNI 01-3818-1995, Escherichia coli is one of the microbial contaminants that exist in meatballs. This is supported by the research of rahmi et al (2015) that out of 32 samples of beef meatballs studied, 18 samples of beef meatballs (56.25%) were contaminated with Escherichia coli of 3.6 CFU / g.

Escherichia coli is one of the Coliphomic bacteria that is commonly found in the environment. This bacterium has a fairly microscopic size, which is about 2 μm in length and 0.4 μm in width, but this bacterium is very widespread and has pathogenic properties so that it becomes one of the bacteria that can cause disease and even death that occurs almost all over the world [15]

Various diseases that can occur due to these bacteria, such as urinary tract infections or what is often abbreviated as UTI, pneumonia, diarrhea and wound

Journal of Health, Technology, and Science (JHTS)   Asnita Kamumu, et. al.

E-ISSN: 2746-167X, Vol. 2, No. 1, March 2021   pp. 44-50

infections that commonly occur in the stomach. Some of these diseases or infections can occur if the number of bacteria is present in large numbers [7]

Seeing the negative impact of harmful pathogenic microbial contamination, processing and serving of ready-to-eat food, especially meatballs, need to pay attention to its hygiene, especially in home industries.

Based on the results of observations made by researchers that in the Marisa market there are a number of meatball traders who, if seen, do not meet the standards in terms of packaging. This can be a big opportunity for contamination by microorganisms.

From this background, the researchers are interested in conducting research on the test for bacterial contamination of meat ball products in Marisa traditional market, Pohuwato Regency.

RESEARCH METHOD

This research was conducted in Pohuwato Regency in May 2020. Examination of samples against bacterial contamination was carried out at the Laboratory of the Faculty of Science, Technology and Health Sciences, UBMG. The object of this research was the meatball sold in Marisa Traditional Market, Pohuwato regency.

Sampling Techniques

The sampling technique used in this research was incidental sampling. Namely, the technique of determining the sample by chance, that is, all the meatballs sold that are accidentally encountered by the researcher can be used as a sample, if it is considered that the accidentally encountered object is suitable as a data source.

The tools used were autoclave, Bunsen, petri dishes, porcelain dishes, Erlenmeyer, measuring cup, incubator, tripod, wire netting, matches, Erlenmeyer flask, micropipette, mortar, digital balance, dropper pipette, clamp, stirrer, stomacher, tip pipette, test tube. 70% alcohol, Aquadest, concentrated sulfuric acid, Beef meatballs, Egg Yolk Tellurite Emulsion, Filter paper, KMnO4, Lactose Broth (LB) Solution, Butterfield's Phosphate Buffered Solution, Baird Parker Agar (BPA) Media, Peptone Water (BPW) Buffer Media), EC broth Media, Nutrient Agar (NA) Media, Methanol, Spiritus.

Collecting the samples

The samples used were meatballs from meatball traders. From each trader the meatball was taken. Then put in a plastic bag. Then given a name label on each plastic. Then put it in the icebox and taken to the laboratory for further observation.

Technique of Data Analysis

The research data were analyzed descriptively and presented in tabular form to describe the total plate count number of pathogenic microbial contamination on meatballs and E. coli bacteria. Based on SNI 01-3818-1995 total plate number (ALT) of colony / g, a maximum of 0.1×10^5, Escherichia coli AMP / g < 3.0.

RESEARCH RESULT

The results show that the total microbes in the meatball samples obtained from Marisa traditional markets still meet the Indonesian National standards because the number of bacterial colonies is at the specified standard, namely 1×10^5 colonies/g even most of them were below standard. These conditions are presented in table 4.1.

Total Microbes in beef meatball samples in Marisa traditional market, Pohuwato Regency.

NO	SAMPLE CODE	Total of microbes (colonies/g)	SNI 7388:2009 Products of the meat (colonies/g)	Note
1	A	$5,0 \times 10^4$	1×10^5	Ms
2	B	$8,4 \times 10^4$	1×10^5	Ms

3	C	$8,8 \times 10^4$	1×10^5	Ms
4	D	$2,3 \times 10^5$	1×10^5	Ms
5	E	$4,5 \times 10^4$	1×10^5	Ms

Ket; Ms: Qualify

Source: Primary data (2020)

Based on the table above, sample A has a total microbe of 5.0×10^4 colonies / g fulfills the requirements, sample B is 8.4×10^4 colonies / g fulfills the requirements, sample C is 8.8×10^4 colonies / g fulfills the requirements, sample D of $2,3 \times 10^5$ colonies / g fulfilled the requirements and sample E had a total of 4.5×10^4 colonies / g of microbes.

The Most Possible Number (APM) or MPN of Coliform Bacteria in Beef Meatballs

Based on the calculation results, the most likely number (APM) of Coliform bacteria in the meatball samples obtained from Marisa traditional markets is above the Indonesian National Standard, namely 10 MPN/g, this is presented in table 4.2.

The Most Possible Number (APM) of Coliform on Beef Meatballs in Marisa Traditional Market, Pohuwato Regency.

NO	SAMPLE CODE	APM coliform (g)	SNI 7388:2009 Products of meat	Notes
1	A	29	10/g	Tms
2	B	240	10/g	Tms
3	C	7	10/g	Ms
4	D	28	10/g	Tms
5	E	460	10/g	Tms

Ket; Ms : Qualify

Tms: Not qualify

Source: Primary Data (2020).

Based on the table above, sample A has a coliform APM of 29 MPN/g, sample B is 240 MPN/g, sample C is 7 MPN/g, sample D is 28 MPN/g and sample E has a coliform APM of 460 MPN/g. If you look at the average AMP coliform value is above the Indonesian National Standard, namely 10 MPN/g even 2 samples have a very high value, namely B; 240/g and E; 460/g. Thus, only 1 sample met the requirements that is sample C

DISCUSSION

Total of Microbes in Meatballs

The testing of total microbes in foodstuffs is carried out to determine the number of microbes in these foods. If a food processed product has been contaminated with microorganisms, the quality of the food will decrease, even if consumed, it will become dangerous. Various pathogenic bacteria can contaminate food. These bacteria can come from the environment such as air, water and soil.

Based on the results of the research, the total microbes in the meatball samples obtained from Marisa traditional markets ranged from 4.5×10^4 colonies / g to 2.3×10^5 colonies / g. This shows that the meatballs still meet the requirements for the number of microbial colonies. This is in accordance with the SNI for processed meat products, namely 1×10^5 colonies / g (SNI 7388: 2009).

The low level of microbial contamination in meatballs is due to the fact that there are more *mesophic* types of microbes where the origin is raw materials such as meat which has died during the boiling process.

When after 5 hours of cutting the raw materials to make meatballs, the meat has a TPC value of 1.9×10^8 colonies / g, then the TPC value becomes 4.1×10^2 colonies / g after processing and boiling it into meatball products [14]

The presence of microorganisms in foodstuffs is related to the presence of these microorganisms in raw materials, or related to unhygienic handling during processing, storage and distribution, or it can also be related to the resistance of microorganisms during the processing and storage process [5]

Meatballs that have undergone a boiling process, microbial contamination does not come from raw materials, but from contamination after the meatballs are cooked. Contamination can come from

hands, clothing, storage containers, air, dust, packaging wrapping and so on.

Efforts to prevent contamination and the development of microorganisms in meatballs after boiling are by implementing sanitation and hygiene during the packaging, storage, distribution and sales processes and implementing a cold chain system during distribution and storage. This needs to be done because in cold temperatures microorganisms grow very slowly because of factors that affect the intermediate metabolic that is temperature. At low temperatures the enzymes work slowly or even become inactive. Meatballs that meet the requirements for a total number of microbes as much as 100% means that all the samples examined are in the standard set by SNI.

The meatball can be said to be safe because the type of microbial pollutant is not yet known, whether the microbe is classified as a pathogenic microbe or not.

In general, total bacterial colonies have no relationship with food safety, but have a relationship with benefits, which can improve quality, half-life or shelf life, hygienic status and contamination during production. The lack of hygiene of a product because at the stage or process of processing it has been contaminated by bacteria, where at one or more stages of processing such as water or food there has been indirect contact with dirt. Contamination or contamination that occurs in these foodstuffs will cause food poisoning in consumers (Food Borne Diseases) [17]

Coliform in Meatballs

Coliforms are facultative anaerobic, gram-negative, non-spore-forming, rod-shaped, red colony with a metallic (gold) sheen within 24 hours at 35 ° C in the final type medium containing lactose. Coliform bacteria can be divided into 2 groups, namely fecal and non-fecal Coliforms. Examples of fecal coliforms are Escherichia coli, and non-fecal coliforms include *Enterobacter aerogenes.* Escherichia coli is a gramnegative bacterium about 2 μm in length; diameter 0.7 μm; width 0.4 μm - 0.7 μm. Escherichia coli forms colonies that are round, convex, and smooth with distinct edges [4] Bacteria are bacteria that come from animal and human feces.

Therefore, the standard of food processing requires that Escherichia coli be negative. Fecal Coliform bacteria is an indicator of pathogenic bacterial contamination. Determination of fecal coliforms is an indicator of pollution because the number of colonies is definitely positively correlated with the presence of pathogenic bacteria [9] Apart from being found in the digestive tracts of humans and animals, coliform is also found in soil, water and plants contaminated by feces. Home-made meatballs that will be contaminated with Coliform can come from dust or raw materials because they are generally stored in the open and mixed with other ingredients.

The factors causing the contamination of meatball products by coliform bacteria are storage time, hygienic and sanitary practices. Hygienic and sanitary practices in food processing include application to personal, equipment, buildings, processes, storage and distribution [6] The shelf life of each food product varies, this is influenced by the quality of the raw materials or basic materials used. The age or shelf life of a product according to [12] is the time or period it takes for the product until the product cannot be consumed after being stored in an appropriate manner and in an appropriate place, this can be seen from its safety, organoleptics, nutrition and physical properties.

Coliform bacteria in meatballs sold in Marisa traditional markets have a high average value, between 29 MPN / g to 460

MPN / g, as required by the Indonesian National Standard, namely 10 MPN / g. This is in line with research (Windayani, 2010) that found as many as 40.8% Colifom from meatball samples produced at home in Marisa traditional markets. Efforts and conditions needed to prevent food from contaminating chemically, biologically and other objects that may occur and can harm, disrupt and endanger consumer health are the definitions of food safety [11]]

CONCLUSIONS

Based on the results of the study, it can be concluded that the total microbes in beef meatballs in Marisa traditional market, Pohuwato Regency ranged from 4.5 x 10 4 Colonies / g to 2.3 x 105 colonies / g. This shows that the meatballs still meet the requirements for the number of microbial colonies. The most likely number (AMP) of coliform bacteria in beef meatballs is still high.

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