ANALYSIS OF MICROBIAL POLLUTION ON THE CHILLS OF THE CONTENT CHILLS USED IN THE ENVIRONMENT OFFICE IN TEUKU UMAR UNIVERSITY

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Abstract: Chili sauce is a sauce obtained from processing the main ingredient of chili *(Capsicumannum)* cooked and good with or without the addition of other food ingredients and used as a food flavoring or foodstuff that is often used every day by both the canteen, stalls, households, restaurants and so forth. Attention to the hygiene of chili sauce is sometimes overlooked, this is one of the factors that can cause a decrease in public health when consuming chili sauce that has been contaminated with various types of microbes. The purpose of this study is to determine whether there is microbial content in chili sauce used in seven (7) canteens out of a total population of 21 canteens in Teuku Umar University. The research method used in this research is *experimental* researchis by means of laboratory testing using MPN *(Most Porbable Number)* media to see the presence or absence of microbes and their types in refill chili sauce. The results of the study showed that three (3) canteens including chilli sauce refill used that were used positively were contaminated by *Coliform* microbes . For the management of the canteen is expected to always maintain the sanitation and hygiene of the canteen environment, refill chilli sauce storage containers, water used in daily life, and personal hygiene of the management and canteen workers in the Teuku Umar University environment in order to comply with health standards .

Keywords: Pollution, Microbes, Chili Sauce, Canteen

Introduction

Healthy food that is fit for consumption by every human being is a food ingredient that is in good condition and fresh, not damaged and contains protein, vitamins, and minerals. Foods that have to go through processing must not change shape, color, and taste, and the additives must meet the applicable minimum requirements for healthy food [9] .

The attention of the international community on healthy, nutritious and hygienic food is enormous. The International Organization for Standarization (*ISO*) issued the standard because in recent years, it has been seen that cases of food poisoning are increasingly widespread. For the implementation of a national food quality and safety system, a SWOT analysis has been carried out that identifies the strengths, weaknesses, opportunities and threats faced. From the results of the analysis the policies that need to be adopted, and the strategies, programs and activities that need to be carried out to ensure the production of food products that meet quality and safety requirements for domestic and global trade, namely through the HACCP approach to produce safe products, and refer to to ISO 9000 (*QMS*) to produce consistent products and ISO 14000 (*EMS*) to guarantee food products that are environmentally friendly. Present the development of a national food quality and safety system, which emphasizes the application of a quality assurance system for each link in food processing, namely GAP / GFP (Good Agriculture / Farming Practices), GHP (Good Handling Practices), GMP (Good Manufacturing Practices), GDP (Good Distribution Practices), GRP (Good Retailing Practices) and GCP (Good Cathering Practices) [3] .

The food supervision aims to protect the consumer community against the possibility of food circulation that does not meet health standards and requirements that can harm or endanger health [1] .Circulation of food that can endanger health is caused by food

contamination by chemical and biological pollution. The most common thing that happens in food poisoning is pollution caused by biological pollution. Biological pollution is caused by various bacteria such as anaerobic bacteria, Coliform, E. Coli, Salmonella, Shigella, Staphylococcus aureus, Streptococcus faecalis, Vibrio, and others [7] .

One food product that is often used by various parties is a type of processed food products, such as chili sauce. Some cases related to food pollution caused by sauce are cases of food poisoning on the diet in the United States (USA) which occurred in mid-April 2008 where around 145 people were infected with a disease caused by Salmonella bacteria. The local food regulatory agency has given a warning that the possibility of poisoning that occurred came from a sauce that allegedly contains Salmonella bacteria as a cause of poisoning it [9] .

In addition to the case examples above, in Indonesia, precisely in Cirebon, a Consumer Protection Foundation Research institute, published that the sauce and soy sauce produced in Cirebon is doubtful about its cleanliness. The basis of the publication of the research is to obtain data that as much as 80% of companies making traditional sauce and soy sauce or home industry are allegedly not complying with the sanitation quality standards set by the Ministry of Health, so that with the low quality of sanitation, it makes it easier for microbes or bacteria to contaminate the manufactured sauce products. so it has an impact on public health [7] .

Microbial contamination is commonly found in snacks, food sold in roadside canteens, catering food, animal food (meat, chicken and fish) sold in markets and other traditional foods [7] . Canteen is one place to enjoy various food menus. In addition, the canteen also provides chili sauce to complement the menu dishes that are served, such as fried noodles, bakwan and fried foods and the like which when consumed very often accompanied by refill chili sauce. The initial survey was carried out on 15 September 2012 and from this survey shows that refillable chili sauce that has been used up in bottles will usually be refilled immediately by the canteen manager without cleaning the bottle first. If the canteen is rarely visited by students or lecturers then the sauce is not replaced before it runs out. Thus it can be concluded that with such behavior unnoticed by both canteen managers and consumers from students and lecturers has opened opportunities for microbial breeding that can endanger health in the refill sauce. Based on the description above, an analysis of microbial pollution is found in the refill chili sauce in the Teuku Umar University environment .

Writing purpose

Based on the background above, the purpose of this paper is to:

1. To find out whether there is microbial pollution in the refill chili sauce used in 7 canteens in Teuku Umar University.
2. To find out the types of microbes that can grow in refill chili sauce that is adjusted to SNI No. 01-2976-1992 namely *Coliform, E.coli, S.aureus, Salmonella* and Fungi bacteria .
3. As a way to find solutions so that microbial pollution can be avoided.
4. To see Sanitation Hygene in 7 canteens in Teuku Umar University.
5. As input information to the canteen manager and consumers

Literature review

Microbial history

Microbes or microorganisms are living organisms that are very small in size that cannot be seen by the naked eye so to see it requires a light microscope. Millions of bacteria live around the human environment but some of these bacteria are harmless to humans, even some

bacteria live in the human body which plays an important role in protecting the body from attacks by external organisms and also helps in the digestion process, and makes vitamins needed by the body . But there are some other bacteria that are pathogenic that can cause pain from the central nervous system which can cause infectious diseases and even cause serious infections in humans. The main groups of microorganisms are bacteria, fungi, protozoa, algae and viruses. In general, microbes can develop by cell division, spores, conidia, pieces of mycelium, etc. Growth is very fast and some are very slow depending on the type [11] .

In the 19th century people began to have an understanding that disease was caused by microorganisms. In 1840, a German disease specialist named Jacob Henle stated that a certain disease was caused by a group of microorganisms. This statement was confirmed by Robert Koch (1843-1910). The Koch postulates are:

1. Suspected microorganisms must be investigated immediately, so that it is known immediately if the disease is contagious;
2. Microorganisms can be taken *(isolated)* and grown into pure culture in the laboratory.
3. If the pure culture is injected into healthy animals, it will cause the same disease.
4. Microorganisms injected in healthy animals can be recovered through the use of laboratory procedures [18] .

In addition there are beneficial, there are also harmful microbes, namely microbial spoilage and pathogens. Spoilage microbes are microbes that can decompose the material so that it becomes rotten, for example rotten food. Pathogenic microbes are microbes that can cause diseases in humans such as tuberculosis, typhus, dysentery, cholera and so on. Certain bacteria can also produce toxins which, if ingested, will pose health hazards to humans. In addition to bacteria, mold can also produce poisons such as Aspergillus flavus which produce toxin aflatoxin. These molds often grow on grains such as corn, and beans such as peanuts, if the storage conditions are bad, which is warm and moist [12] .

Diseases caused by food microbes are divided into infectious diseases caused by food microbes such as undercooked food cooking, storage of food at inappropriate temperatures so as to facilitate microbial growth, food obtained from unclean sources, tools used have been contaminated, personal health unfavorable, as well as ways of preserving imperfect food [18] , and diseases of food origin caused by:

Coliform is an anaerobic bacteria, belonging to gram negative bacteria, does not form spores, and can ferment lactose to produce acids and gases at 35 ° C-37 ° C. Disorders caused in healthy humans are nausea, abdominal pain, vomiting, diarrhea, bloody stools, high fever, and in some cases even seizures can occur and lack of fluids or dehydration. *Coliform* bacteria are a group of microorganisms commonly used as indicators, where these bacteria can be a signal to determine whether a water source has been contaminated by pathogens or not. Based on research, this *Coliform* bacteria produces etionin which can cause cancer. In addition, these spoilage bacteria also produce various poisons such as Indol and Skatol which can cause disease if the amount is excessive in the body. *Coliform* can be used as an indicator because its density is directly proportional to the level of water pollution. This bacterium can detect pathogens in water such as viruses, protozoa, and parasites. In addition, *Coliform* also has a higher resistance than pathogens and is more easily isolated and grown. Water-borne diseases are usually caused by *Coliform* bacteria . They are usually found in water treatment system channels [8].

Refill Sauce.

Refill sauce is a sauce in a plastic package that is refilled into bottles already available in the canteen or stall. Packaging or refill is packaging, packaging or packaging which is a

way of preserving agricultural products, because packaging can extend the shelf life of materials and can prevent damage to the material that is packaged or packaged [9] .

Chili sauce.

Chili sauce is a sauce obtained from processing the main ingredient of chili (Capsicum annum) which is cooked and good with or without the addition of other food ingredients and is used as a food flavoring.In the heating process, there are two factors that must be considered, namely the amount of heat given must be sufficient to kill off pathogenic microbes and the amount of heat used must not cause a decrease in nutrition and food taste [7] .

Definition of Sanitary Hygiene

Sanitation in food leads to efforts to create and improve conditions that can prevent food contamination that can cause food poisoning. Hygiene can be defined as actions taken to ensure that a food is free from harmful substances, various dangerous substances or substances can be found both inside and outside of the food.

Food Hygiene Aspects of Sanitation

Food sanitation aspects are the main aspects of food sanitation that affect food safety. Food sanitation aspects consist of 4 (four) parts, namely contamination or contamination, food poisoning, spoilage, counterfeiting [6].

Hygiene Principles of Sanitation in Food and Beverages

the principle of hygiene sanitation of food and beverages is the control of four factors namely the place or building, equipment, people and food ingredients. There are 6 (six) principles of food and beverage hygiene sanitation, namely food selection, food storage, food processing, food storage, food transportation, food serving [6] .

Microbiology Test

Microbiological tests performed on ready-made sauces usually consist of determining aerobic microorganisms, namely the Coliform test [9] .

Conceptual framework

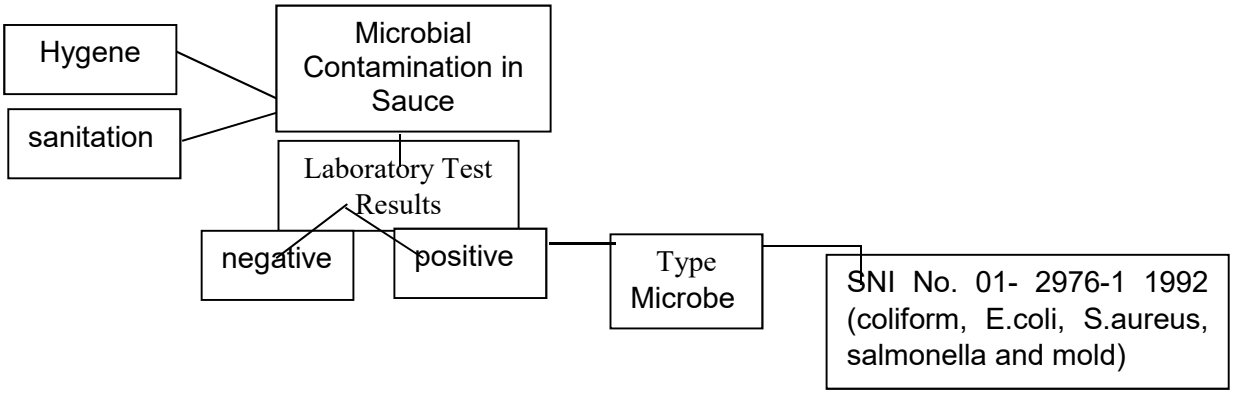

Figure 1: Research Conceptual Framework

Research Methods

This research was conducted on the refill chili sauce obtained from 7 (seven) canteens around the Teuku Umar University (UTU) environment. Sample examinations were carried out at the Banda Aceh Health Analysis Academy Laboratory. This research was conducted from October 2017 and collected samples and laboratory tests using the *Most Probable Number* (MPN) method to determine the types of microbes that can grow in refill sauces.

This research is an *experimental research* that is by means of laboratory testing to determine the presence or absence of microbes and their types in refill chili sauce used in 7 (seven) canteens around the University of Teuku Umar [10] . Analysis of the data obtained was processed manually then compared with the Indonesian National Standard regarding the requirements of chili sauce (SNI) No. 01-2976-1992 microbes that pollute the refill chili sauce.

Results and Discussion

Results

Canteen Characteristics

The general description for the canteen manager in Teuku Umar University environment includes the sex of the canteen manager or respondents who are male as much as 2 people (25%) and who are female as many as 5 people (75%). Respondents with age group 20 years amounted to 1 person (10%), respondents with age group 30-40 numbered 4 people (65%), and respondents with age group 50-65 years amounted to 2 people (25%). For the use of 6 canteen sauces (90%) of them using chili sauce with two traditional fish types and those using chili sauce with a type of dena amounted to 1 canteen (10%).

Laboratory Test Results

The results showed that the refill chili sauce, some were positively contaminated by Coliform microbes and some were negative or not contaminated by microbes. Results of laboratory tests Banda Aceh Health Academy Analysis shows that of the seven samples studied, 4 code samples are S aus $_1$, S aus $_2$, S aus $_3$, and S aus $_4$ negative contaminated by microbes. While three other sample code, namely S aus $_5$, S aus $_6$, and S aus $_7$ positive coliform contaminated by microbial species. This is allegedly caused by the treatment of the canteen manager who has not met health standards in the use of refillable chili sauce so that it can be contaminated by microbes.

Canteen Manager Questionnaire Results

Based on the results of a visit to 7 sample canteens, 10 questions were obtained which showed that 4 canteens met health requirements and standards and 3 canteens did not meet the health standards and standards established by the Indonesian National Standards [14] .

Discussion

The results of observations of 7 canteens around the University of Teuku Umar environment, 3 of which were contaminated by microbes due to the refill chili sauce used had been contaminated with unwanted foreign substances that resulted in people consuming the refill chili sauce. The contamination can occur due to several things, such as the use of water by unhygienic canteen managers, refill chilli sauce storage containers are not cleaned and not covered so as to allow microbial growth in sauces, environmental sanitation is not good so it is often visited by insects that are the source of disease, The refill chili sauce has been mixed

with other substances, as well as the unhygienic management in maintaining personal hygiene so contamination can occur.

Managers with the code Sauce $_{5,}$ Sauce $_{6}$, and Sauce $_{7}$ use water that is not hygienic so that pollution can occur. This is the easiest and most common contamination process because it is direct. [7] states that contamination can occur in 2 (two) ways, one of which is direct contamination where contaminants can be in the form of chemicals and biology such as bacteria and fungi contained in air, soil, and water.Supported by the opinion [8] which confirms that waterborne diseases are usually caused by *Coliform* bacteria . Managers with the code Sauce $_{5,}$ Sauce $_{6}$, and Sauce $_{7}$ use a container to store chilli sauce refill that is not cleaned, causing chili sauce contaminated by microbes. Even the managers with the code Sauce $_{5,}$ and Sauce $_{6}$ use a container where the storage of chili sauce is not closed so that the chili sauce is contaminated by microbes. [18] recommends that food pollution by microbes can be reduced if washing equipment is carried out with good sanitation. Washing tools must use hygienic water as well, if using water that is not hygienic then washed tools can be contaminated by microbes. The use of uncovered containers is one of the violations of the health requirements issued by [6] which emphasizes that food stored must be covered in order to avoid insects and other animals.

Managers with the code Sauce $_{6}$ mix chili sauce with other substances in order to increase the quantity of sauce to be more. This also contradicts the recommendations issued by [6] that efforts to change the appearance of food by adding or replacing food ingredients intentionally to obtain maximum profits can adversely affect consumers.

Factors contamination that comes from the manager and the health workers themselves are not hygienic, also conducted by managers with Sauce code $_{5,}$ Sauces $_{6}$, and Sauces $_{7.}$ [17] explained that the private good personal hygiene is very important in controlling the disease. People who handle the process of making food can transmit pathogenic microbes both from people suffering from diseases caused by microorganisms and infected scars. According to [1] , pathogenic bacteria that originate from digestion have a good chance to contaminate food if it is exposed to contaminated hands. Workers who handle food can transfer pathogens to spices and foodstuffs if they do not wash their hands after using the toilet. Important pathogenic bacteria from the digestive tract can cause cholera, basiller dysentery, typhoid fever, and hepatitis. Food surveillance is carried out with the aim of protecting the consumer community against the possibility of food circulation which does not meet health standards and requirements that can harm or endanger health.

The canteen manager with Sauce $_{7\ has}$ poor environmental sanitation that is often visited by insects so that it can be contaminated by microbes. [6] , states that food contamination can be caused by physical pollution (hair, dust, soil, insects, etc.), microbial pollution (bacteria, fungi, candawan), chemical pollution (fertilizers, pesticides, mercury, arsenic, etc.), and active radio pollution (radiation, alpha rays, gamma rays, etc.).

The lack of canteen management awareness of the hygiene of refill chili sauce is very alarming because it will have an impact on people who consume the refill chili sauce. Consuming foods that have been contaminated with *Coliform* microbes will have an impact on the digestive process of consumers which will eventually experience other health problems such as gastrointestinal infections and disorders of the body's defense mechanism. [8] states that the *Coliform* bacteria produce ethionine which causes cancer, produces various poisons such as Indol and Skatol which can cause disease if it is excessive in the body, and can cause digestive disorders such as diarrhea.

[2] added that bacteria in the *Coliform* group can cause infections and food poisoning that can be harmful to humans. Coliform has important properties in relation to food damage because of its ability to live well on a variety of substrates and has the ability to use

carbohydrates and other organic components as energy and can use simple nitrogen components as a source of nitrogen.

The presence of *Coliform* bacteria in refill chili sauce occurs due to contamination during processing. Sanitary equipment, premises, and management play an important role in contributing to the pollution of these bacteria. Therefore, the canteen manager must know the health standardization requirements in the management of refill chili sauce so as not to harm the consumer.

Based on [14] , refill chili sauce should not contain microbes or contaminated by microbial types of *Coliform* , E.coli, S.aureus, Salmonella and mold. Therefore, the results of this study prove that Sauce $_{5,}$Sauce $_{6,}$ Sauce $_{7}$ $_{are}$ not suitable for consumption because they do not meet health requirements and standards stipulated by SNI No. 01-2976-1992.

Conclusion

From the results of laboratory tests at the Banda Aceh Health Analysis Academy, it was concluded that: Refill chili sauce in the sample code Sauce $_{1}$, Sauce $_{2}$, Sauce $_{3}$, and Sauce $_{4}$ negatively polluted by microbes , refill chili sauce in the code sample Sauce $_{5}$, Sauce $_{6}$, and Sauce $_{7}$ positive contaminated by microbes , microbes contained in chili sauce refill of types of Coliform , Pollution of the most dominant place in the sauce dena with sample code sauce $_{6,}$ contamination occurs due to negligence and lack of canteen management knowledge of health standards in processing refill chili sauce.

Reference

[1] Badan Pengawas Obat dan Makanan, 2003.*Syarat Personal Higiene Penjamah Makanan.* Bidang Pengujian Mikrobiologi Balai Besar Pengawas Obat dan Makanan. Diperoleh : www.pipimm.or.id [Diakses tanggal 7 Oktober 2017].

[2] Balia, RL., *et al.*2011. *Deteksi Coliform Pada Daging Sapi Giling Spesial yang Dijual di Hipermarket Bandung*. Diperoleh : pustaka.unpad.ac.id [Diakses tanggal 23 Oktober 2012].

[3] Cahyono, B. 2010. *Keamanan Mutu Pangan Dan Penerapan Sistem Kualiti Kontrol*. Diperoleh : www.*proseduralatpengujiansnikualitaskadar.com. [Diakses tanggal 7 Oktober]*.

[4] Chandra, B. 2007. *Pengantar Kesehatan Lingkungan.* EGC. Jakarta.

[5] Depkes RI , 2004. *Bakteri Pencemar Terhadap Makanan.* Kursus HygieneSanitasi Makanan dan Minuman. Direktorat Penyehatan Air danSanitasi Dirjen PPM & PL. Jakarta. Diperoleh : www.indonesian-publichealth.com/2012/06/pencemaran-makanan.html. [Diakses 7 Oktober 2017].

[6] Depkes RI , 2004.*Kumpulan Modul Kursus Higiene Sanitasi Makanan dan Minuman.* KursusHygiene Sanitasi Makanan dan Minuman. Direktorat Penyehatan Airdan Sanitasi Dirjen PPM & PL. Jakarta. Diperoleh : www.scribd.com/doc/97280783/pengertian&sanitasimakanan&minuman. [Diakses tanggal 7 Oktober 2017].

[7] Depkes RI , 2006 .*Bahan Pencemar Makanan Lainnya.* Kursus HygieneSanitasi Makanan dan Minuman. Direktorat Penyehatan Air danSanitasi Dirjen PPM & PL. Jakarta. Perpustakaan. Diperoleh : www.depkes,co.id [Diakses tanggal 7 Oktober 2017].

[8] Dirgantara, P. 2010. *Bakteri Koliform yang Bersifat Anaerob*. Diperoleh : www.1sthumanwinner.com/2010/12/16/bakteri-koliform-yang-bersifat-anaerob [Diakses tanggal 23 Oktober 2012].

[9] Imelda, 2009. *Hygiene Sanitasi dan Analisa Cemaran Mikroba yang terdapat pada Saus Tomat dan Saus Cabai Isi Ulang yang Digunakan di Lingkungan Kampus Universitas Sumatera Utara. Diperoleh :* www.repositori.usu.ac.id/bitsrem/pdf. [Diakses 23 Maret 2017].
[10] Notoatmodjo. 2010.*Metodelogi Penelitian.* RinekaCipta. Jakarta
[11[Pelczar, J.M., dan Chan S.C.E., 2005.*Dasar-Dasar Mikrobiologi 1*. Penerjemah: RatnaSiri H., dkk, Penerbit Universitas Indonesia Press. Jakarta.
[12] Pelczar, J.M., dan Chan S.C.E., 2005.*Dasar-Dasar Mikrobiologi 2*. Penerjemah: RatnaSiri H., dkk, Penerbit Universitas Indonesia Press. Jakarta.
[13] Pitojo, S. 2003.*Benih Cabai*. Kanisius. Yogyakarta.
[14] Standart Nasional Indonesia, 1992. *Saus Cabe. diperoleh :* pphp.deptan.go.id (Horti).pdf. *[Diakses : 7 oktober 2017]*.
[15] Suriawiria, U. 2005. *Mikrobiologi Dasar*. Penerbit Papas Sinar Sinanti. Jakarta.
[16] Suyanti. 2007. *Membuat Aneka Olahan Cabai.* Penebar Swadaya. Jakarta.
[17] Waluyo, L. 2007. *Mikrobiologi Umum Edisi Revisi.* UPT. Universitas Muhammaddiyah Malang Press. Malang.