



NARRATIVE REVIEW: STUDY OF MICROBIAL-BASED TIPPING POINTS AS HALAL FOOD PRODUCTS

Muhammad Faizal Fathurrohlim

Pendidikan Biologi, Universitas Sali Al-Aitaam, Indonesia

Correspondence Author: faizalmaret26@gmail.com

Abstract: The majority of Indonesia's population is Muslim. Halal product testing needs to be tested for its tipping point, especially those made from microbes. Microbial products have been determined by the critical point procedure. The critical point of the idolatry of a food product is a stage of food production where a product allows it to become haram status. Identification of testing the critical point of a microbial product can go through several stages, namely food sources, microbial media, and processing procedures. Based on MUI, halal products are produced from animals or materials that are included in the halal category. The use of microbes in producing products is a rapid step in the food production process. Things that need to be considered in its processing include materials and growth media.

Keywords: Halal, Microbiome, Food, Products, Tipping Point.

INTRODUCTION

25% of the world's population is Muslim. Global halal market consumption reached 2.6 trillion US Dollars (Martusceli, et al, 2020). Indonesia is a country with the largest Muslim majority in the world. Food and beverage products consumed by Indonesian people are quite a lot in imports from non-Muslim countries. Products that enter the Indonesian market must usually have a halal label from MUI (Majelis Ulama Indonesia).

Halal food becomes a mandatory requirement to be consumed by the people of Indonesia considering that the majority of the Indonesian population is Muslim. According to the decree of the Minister of Religious Affairs No. 518 of 2001, halal food is food that does not contain haram elements or materials or is prohibited for Muslim consumption and its processing is not contrary to Islamic sharia. The advice to consume food that is halal and not to consume food that is haram is written in the Qur'an and hadith. The food processing process must meet the standards of idolatry. One of the processing of food is by biotechnological methods.

In biotechnology studies, the process of eating processing there are two methods, namely conventional biotechnology, and modern biotechnology. Conventional biotechnology is by utilizing microbes as the main agent to make food by fermentation, such as cheese, tape, yogurt, kefir, nata, and tempeh. These conventional biotechnological agents can be good bacteria, fungi, and yeast. Modern biotechnology is the utilization of living things in producing goods and services in a complex manner as well as with the use of the latest living things technology. The techniques needed in biotechnology include biochemistry, cell biology microbiology, genetics, molecular biology, immunology, chemical engineering, and informatics that have expanded their studies into Bioinformatics (Fadhilah, et al, 2021).

The benefits of the application of biotechnology are to produce highly nutritious foods, produce fermented food and beverage products, and produce flavoring ingredient products. Along with the times, the need for food continues to increase so it is necessary to increase and improve the quantity and quality of food (Faridah and Sari, 2019). The selection of microbes as ingredients in the food manufacturing process is considered very economical and fast.

The use of microbes in the food industry is becoming part of the world trend. The use of microbes is based on the rapid production of products produced. Microbes become bioprocess agents producing new metabolites and compounds, complex molecular breaking agents, and producers of scents, flavors, and colors. Microbes also play an important role in maintaining the balance of the human gut microbiota. Even gene modification or genetically modified technology (GMT) which is part of the biotechnology era has been widely applied to various types of microbes (Kurniadi dan Frediansyah, 2016).

Every product should be considered about the point of crisis. This includes microbes, media, and tools used. This is very related if there is one element that is not halal then the resulting product becomes not halal. Microbes can be isolated from various places such as leaves, fruit, soil, water, milk, etc. Microbial sources such as blood, parts of the pig's body such as intestines, parts of dead animals' bodies, and animal feces can cause the process to become haram (Kurniadi and Frediansyah, 2016).

MUI Fatwa No. 1 of 2010 explains that regarding the use of microbes and microbial products there are two main points. First, microbes must grow on sacred media. If microbes grow on unclean media, if they can be separated between microbes and media then the law is halal after being purified. Second, microbes or microbial products that utilize pig products as a medium of legal growth are haram. In addition to microbial selection, the use of raw materials and other mixtures must be guaranteed its idolatry. Similarly, the place or container for production must be separate from the pig processing site and its derivatives.

Based on the background above, the author wants to create an article review that can help academics and researchers to provide scientific information about the study of researchers.

METHOD

The method used on this occasion is the study of literature. The resulting data comes from sources in the form of journals, proceedings, and conferences. More detailed search results will be done manually of course in a bibliography that supports and is relevant to the subject matter of this article. The method that determines the crisis point becomes one of the steps in determining whether the product produced is halal or not. The process is divided into three stages, namely the selection of biotechnological products, the flow of product production processes, and the identification of product tipping points (Atma, et al, 2017).

RESULTS AND DISCUSSIONS

1. Yeast

Terms of the idolatry of additives in yeast are what needs to be observed. In the manufacture of compressed yeast is often added emulsifier (emulsifier) and anti-blocky material (anticaking agent) whose status is syubhat. Anticaking agents such as E542 (edible bone phosphate, derived from animal bones), E 570 (stearic acid), and E572 (magnesium stearic). Stearic acid can come from plants or animals, magnesium stearic is made using the basic ingredients of stearic acid. In addition to gum or dextrin, gelatin is sometimes used as a filler in the instant yeast. In the market there is already instant yeast that has been guaranteed to the page, therefore choose instant yeast that has been guaranteed to the page (Apriyantono, 2007).

2. Cheese

The critical point of cheese comes from raw materials. Milk can come from animal or vegetable sources. When milk is sourced from plants such as halal soybeans, it can be ascertained that the cheese is halal. But when milk comes from animal sources, it needs to be checked first. If it comes from animals that are halal consumed such as cow's milk, goat, buffalo, camel, or sheep, then the animal's dairy products are halal (Faridah and Sari, 2019). In addition, it should be considered in the process of slaughter by Islamic sharia.

The tipping point in the cheese-making process is at the coagulation stage. Coagulation is the stage of adding materials to the clumping process. There are two methods of coagulation: enzymatic methods and microbiological methods. The enzymatic method is carried out with the enzyme rennin (rennet). This becomes a risk because rennet-producing animals could be from animals that are not halal. Furthermore, even if it comes from halal animals, it will be a risk if the way of slaughtering rennet-producing animals is not done by Islamic sharia (Apriyantono 2007).

The second method is the microbiological method. The microbiology method can use lactic acid bacteria (BAL) (Melliawati and Nuryati, 2014). The risk is the medium used to grow BAL. The medium used to grow BAL can contain yeast extract, where yeast extract can be at risk from the side results of beer processing (Atma, et al, 2017). In terms of idolatry, it is necessary to look at the media used because it usually consists of milk components and other nutrients such as yeast extracts, minerals, and vitamins. Yeast extract can be not halal if obtained as a result of sampling the beer industry, or if to produce it using a medium that contains non-halal ingredients (Apriyantono, 2012).

3. Tape

Tape is a traditional fermented food made from cassava. During the fermentation process, tape changes biochemical compounds due to the activity of microorganisms. The microorganisms that play a role are derived from the genera *Aspergillus*, *Saccharomyces*, and *Acetobacter*. *Aspergillus* microbes serve to hydrolyze starch in raw materials into simple sweets. *Saccharomyces* convert sugar into alcohol, while *Acetobacter* converts alcohol into lactic acid (Khazalina, 2020). According to the excerpt of MUI Fatwa No.4/2003 on Product

Fatwa Guidelines, on alcohol and its derivatives, it is mentioned that tape does not include khamr. Ethanol which is a pure compound not from the khamr industry is sacred.

Alcoholic fermentation is a common way of plant ingredients that contain sugar, starch, or cellulose. This fermentation usually involves the help of microbes is it bacteria, kapang, or yeast, one of which is *saccharomyces cerevisiae* yeast which is used to ferment glucose into ethanol. Theoretically, 100 grams of glucose could produce 51.4 grams of ethanol and 48.8 grams of carbon dioxide. But in practice, these microbes use glucose for their growth and ethanol produced less than 100% (Badger, 2002).

4. Yogurt

Yogurt is a fermented processed product derived from lactic acid (BAL) bacteria. The bacteria used in general are *Streptococcus thermophilus* and *Lactobacillus bulgaricus*. According to Amen, et al, 2020 in the process of making Yogurt there are three crisis points. The first stage occurs in the process of adding skim powder, casein, and whey for the determination of milk solids. In the first stage, the risk of illegitimacy is present in animal species in the non-halal category that produce milk, skim, and whey.

The second tipping point is the growth media of bacteria that contain non-halal materials. In addition, if the bacteria produced are engineered from animal products that are not halal and human then it can be declared haram bacteria. The third crisis point is in the process of adding additive foodstuffs that are not clear the status of idolatry.

5. Soy sauce

Soy sauce becomes one of the fermented products of microbiological agents. Applying conventional biotechnological conep, soy sauce is fermented by the genus *Aspergillus*. In the manufacturing process, the critical point of soy sauce production lies in the process of mushroom growth media. The medium used in the process of mushroom growth must be halal for example Saboraud Dextrose HiVeg Agar.

CONCLUSION

The production of using microbial materials must be identified regarding the tipping point on the product manufacturing procedure. The critical point procedures identified include microbial growth media and additional materials on the results on product manufacturing results. Examples of halal microbiology-based food production are cheese, tape, yogurt, and soy sauce.

REFERENCES

- Amen O, Jumiono A, dan Fulazzaky MA. 2020. Penjaminan Mutu dan Kehalalan Produk Olahan Susu. *Jurnal Pangan Halal*. Vol. 2, No.1. pp: 42 – 48.
- Apriyantono A. 2007. Potensi Ketidakhalalan Produk Pangan dan Masalah Pangan Hasil Rekayasa Genetika. Kiblat. Bandung.
- Atma Y, Taufik M, dan Setiono H. 2016. Identifikasi Resiko Titik Kehalalan Produk Pangan: Studi Produk Bioteknologi. *Jurnal Teknologi*. Vol 10, No. 1. pp: 59 – 66.
- Badger PC. 2002. Ethanol From Cellulose: A General Review. Reprinted from: Trends in New Crops and New Uses. 2002. J. Janick and A. Whipkey (eds.). ASHS Press. Alexandria.
- Fadhilah FR, Rezaldi F, Fadhilah MF, Fathurrohlim MF dan Setiawan U. 2021. Narrative Review: Metode Analisis Produk Vaksin Yang Aman dan Halal Berdasarkan Perspektif Bioteknologi. *International Journal Matha'ul Anwar*. Vol. 1, No. 1. pp: 64 – 80.
- Faridah HD dan Sari SK. 2019. Pemanfaatan Mikroorganisme dalam Pengembangan Makanan Halal Berbasis Bioteknologi. *Journal of Halal Product and Research*. Vol 2, No. 1. pp: 33 -33.
- Khazalina T. 2020. *Saccharomyces cerevisiae* dalam Pembuatan Produk Halal Berbasis Bioteknologi Konvensional dan Rekayasa Genetika. *Journal of Halal Product and Research*. Vol. 3, No. 2. pp: 88 – 94.
- Kurniadi M, dan Frediansyah A. 2016. Prespektif Halal Produk Pangan Berbasis Bioproses Mikrobial. *Reaktor*. Vol. 16, No. 3. pp: 147 – 160.
- Majelis Ulama Indonesia. 2010. Fatwa Majelis Ulama Indonesia No. 1 Tahun 2010 Tentang Penggunaan Mikroba dan Produk Mikrobial dalam Produk Pangan.
- Martusceli M, Serio A, Capezio O, and Mastrocola D. 2020. Safety, Quality and Analytical Authentication of halal Meat Products, with Particular Emphasis on Salami: A Review. *Foods*. Vol. 9. pp: 1 – 19.
- Melliawati R., dan Nuryati. 2014. Studi Awal Proses Pembuatan Keju Menggunakan Bakteri Asam Laktat Terseleksi. *Prosiding Seminar Nasional XVI, Kimia dalam Pembangunan*: 141 – 148.