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Original Research Article

Hygiene of Sanitation and Quality Soaking Water of Tofu: A Case Study of The Household Industry UD Sari Makmur, Wakobalu Agung Village

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Abstract: Hygiene and healthy sanitation are the principles in food service. Foodstuffs that are not managed properly and properly can cause negative impacts such as disease and poisoning. Contaminants contained in tofu products that can harm the community include microbiological and chemical contamination. The purpose of this study was to analyze the sanitation hygiene and quality of tofu soaking water in a bacteriological and chemical manner at UD Sari Makmur, Wakobalu Agung Village. The research is descriptive through an observational approach using data collection techniques by interviewing, observing and testing laboratory results. Interviews were conducted on workers and home industry owners while observations were made using observation sheets. Samples taken and tested in the laboratory were tofu-soaked water samples. The results showed that hygiene and sanitation in the household industry were aspects of worker hygiene (50,0%), while environmental sanitation aspects were in the form of location and production environment (50,0%) and buildings, production facilities (45,0%). The results obtained from hygiene and sanitation are still lacking. Testing the quality of the tofu water bath through bacteriological, and chemical. The test that is not in accordance with the standard is Eschenchia coli 4,3.105. Meanwhile, the Salmonella test was 0 col/ml or negative and Arsenic was still below the quality standard of 0,0426. The advice given by researchers to the household industry is to improve and supervise environmental hygiene and sanitation in the production environment.

Keywords: Sanitation, hygiene, tofu soaking water, home industry.

INTRODUCTION

Along with the high public need for the importance of food needs, especially tofu, it encourages the tofu industry not to pay attention to sanitation hygiene. Most of the food processing household industries are a problem because of the condition of the buildings and facilities as well as the personal hygiene of employees in a home industry (Suwandewi, Rusminingsih, and Purna. 2019). According to Fatmawati *et al*., (2013), the implementation of food hygiene and healthy sanitation are the principles in food administration. Foodstuffs that are not managed properly and properly can cause negative impacts such as disease and poisoning.

In the process of making out, contamination usually comes from the factory environment is not good sanitation, and hygiene themselves (personal hygiene) know of craftsmen. The behavior of tofu craftsmen in maintaining personal hygiene, especially hand hygiene, will greatly affect the tofu products produced. Hands are not clean, carry various types of harmful microorganisms that can cause the product to know not hygienic. Besides poor environmental sanitation will also cause the food products produced to be not hygienic (Putri and Dewi, 2017). Environmental of production which does not meet of the requirements, such as lighting factory is less, floors are always wet, drain water that is not smooth, and water sources are not meeting the requirements will affect the quality product.

Tofu is a product made from soy protein clumps. Due to its high protein and fat content, tofu is a perishable product. At room temperature and without packaging, the shelf life of tofu is only 1-2 days. More than that, over time the taste becomes sour, then over time, it becomes rotten (Sarwono, 2001).

According to Andarwulanm N, *et al*., (2018) the composition of tofu consists of 88% water content, 6% protein, 3,5% fat, 1,9% carbohydrates and, 0,6% ash content. The high protein content of tofu causes tofu to be easily damaged, this is due to protein as a good medium for the growth of microorganisms such as bacteria, if the nutritional value of good tofu becomes toxic, it will experience pollution. Sources of contamination in tofu soaked water can be through the quality of tofu soaking water and the worker's production environment. Soil and water are natural habitats for bacteria, including Escherichia coli, Staphylococcus aureus, Bacillus cereus, Coliform and Salmonella sp. (Verawati *et al*., 2019) In bacteria eschencia coli easily contracted in the food because handlers unhygienic behavior, washing equipment that is not clean, the health of the processors and food handlers as, well as the use of the washing water is not clean.

The presence of microorganisms in water is one of the biological parameters to determine water quality requirements. One group of microorganisms that is very important to note its presence in water is bacteria, especially those that are enteropathogenic which are harmful to humans, for example, Escherichia coli (Hasriani, 2013). In addition, food contamination, especially arsenic, needs to be known to ensure food security and safety. Arsenic is a highly toxic and carcinogenic metalloid.

Based on initial observations at UD Sari Makmur that hand washing facilities are not available yet equipped with soap, the production room is dirty and usually, the water is stagnant or the floor is not impermeable, the condition of the open room is only a tin roof or ceiling while the walls are still open, only a few of the workers using personal protective equipment, such as gloves, leftover disposal is allowed to flow in sewers around the household industry, where the business owner lives is in the same building, for garbage disposal, garbage is only placed outside the room, at any time it can be used for animal feed, vehicles food may be contaminated with dust and smoke. In addition, the production of the tofu business has not yet received a health-worthy certificate.

METHOD RESEARCH

The type of research used is descriptive through an observational approach, where this type of research is examining an object and describing the existing conditions by making direct observations using an examination form as a means of determining the level of sanitation hygiene. Determination of sanitation hygiene is based on food handlers, location and production environment, and aspects of the building or production facilities as well as the bacteriological quality of tofu and chemicals based on the quality standard of SNI Number: 01-3142-1998.

The research was conducted at UD Sari Makmur Home Industry, Wakobalu Agung village, Muna Regency. The time of the study was carried out in May-October 2021. The research population consisted of food handlers, namely workers from the production to packaging divisions totaling 14 people. While the samples taken were tofu soaked water. The sample was put into a coolbox and brought to the laboratory for testing. Laboratory analysis with Ecshencia Coli, Salmonella, and Arsenic parameters using the specification of the Spread Plate method. The data processing technique is filling out a checklist on the observation sheet, giving a score in the form of numbers which is then tabulated in a table and analyzed using a frequency distribution.

RESULT AND DICCUSSION

Characteristics of Respondents

Table 1: Characteristics of Respondents

Characteristics	Amount	%
Gender		
an	10	71,4
oman	4	28,5
Amount	**14**	**100**
Age		
< 30 yrs old	8	57,1
30-40 years old	4	28,5
> 40 years	2	14,2
Amount	**14**	**100**
Length of working		
<5 years	8	57,1

5-10 years	6	42,8
>10 years	0	0
Amount	**14**	**100**
Education		
Primary School	3	21,5
Junior high school	7	50,0
Senior High School	4	28,5
Amount	**14**	**100**

The results showed that 14 workers were working at household industry UD Sari Makmur. The majority of workers are men with a percentage of 71,4% and women with a percentage of 28,5%. Men are more in physical work and other women are in packaging. Based on age, the most at age <30 with a percentage of 57,1% and the most length of work is <5% with a percentage of 57,1%. The job will be better done if you have a good experience. Meanwhile, based on the level of education, the highest number is SMP with a percentage of 50,0% (Table 1).

Table 2: Results of observations and interviews of household industry workers on hygiene aspects

Hygiene Observations of food handlers	**Score**	**Max**
Maintain cleanliness before work	4	6
Washing hands with soap	4	6
Urination and defecate in the Toilet	5	6
Do are Smoking Activities	2	6
Keep your nails clean and well-groomed	4	6
Wearing special clothes	0	6
Using protective equipment	2	6
Total score	**21**	**42**
Percentage (%)	**50,0**	**100**

Based on the results of the study that workers based on hygiene aspects obtained a percentage of 50,0%. This relates to health efforts to maintain and protect worker hygiene (Table 2).

Table 3: Results of observations and interviews on aspects of the location and production environment

Aspects of location and production environment	**Score**	**Max**
General environmental conditions	2	5
Maintain the cleanliness of the production site	3	5
The existence and condition of the trash can	3	5
Protect roads from dust and puddles	1	5
Total score	**9**	**20**
Percentage (%)	**50,0**	**100**

Based on the results of the study that workers based on the location and production environment aspects obtained a percentage of 50,0%. Based on this, it is still in the poor category (Table 3).

Table 4: Results of observations and interviews on aspects of buildings and production facilities

Aspects of buildings and production facilities	**Score**	**Max**
floor	3	5
Wall	3	5
Palate	4	5
Door	0	5
Window	0	5
Ventilation	3	5
Lighting	5	5
Total score	**18**	**35**
Percentage (%)	**45,0**	**100**

Based on the results of the study that workers based on aspects of buildings and production facilities obtained a percentage of 45,0%. Based on this, it is still in the poor category (Table 4).

Table 5: Result Quality Soaking Water of Tofu to inspection

Quality	Quality standards	Test results	Qualify	not eligible
Bacteriological				
1. Escherichia coli	10/100 ml	$4.3.10^5$		√
2 Salmonella	(Negative) 0 col/ml	0	√	
Chemical				
1. Arsenic	0,1 mg/l	0,0426	√	

The physical quality of the tofu soaking water has partially met the quality standards namely, it is tasteless, colorless and, does not meet the odor. Bacteriological quality according to SNI 01-3142-1998. The bacteriological test of tofu- soaked water samples showed positive Escherichia coli with a quantitative value of $4,3.10^5$ ml. Bacteriological testing on salmonella was negative with a quantitative value of 0 col/ml. The chemical test of tofu soaking water (arsenic) is 0,0426 mg/l (Table 5).

This home industry named UD Sari Makmur is located in the village of Wakobalu Agung. The number of workers is the largest compared home industry and other. Based on the aspects studied, sanitation hygiene and the quality of tofu soaking water, because in principle, sanitation hygiene must be considered in the food processing process. Aspects assessed from the hygiene of workers who have met the requirements are maintaining cleanliness before work, namely by bathing, washing hands during the production process. Urination and defecation workers to be precise and wash their hands with soap afterward and some keep their nails clean. Hygiene is considered to be lacking due to several aspects including smoking habits at work, unavailability of special clothing or worker uniforms, lack of use of personal protective equipment. Worker uniforms are important to be used by workers. Workers' clothes must be clean and covered, but usually, workers' clothes use clothes worn from home so that they are likely to be contaminated by dust from outside.

Personal protective equipment is used by workers to protect themselves while working, workers do not all use Personal protective equipment. From the results of observations, some use gloves and boots. Use gloves during the packaging process and do not use them entirely. Personal protective equipment that is suitable for the production process is boots, masks, gloves. Boots are used to prevent slipping usually the floor is flooded by water every day. According to Prianto (2017), mask function and so that food products are not contaminated by dirt from the nose and saliva of workers. Gloves function so as not to be scratched when cutting tofu, in addition to protecting workers when transporting hot loads.

It is important to maintain environmental sanitation so that cross-contamination does not occur and cleanliness is always maintained (Rudiyanto, 2014). The sanitation aspect includes the environmental conditions for the production of buildings and production facilities, the use of clean water and, sanitation facilities. In general, the general environmental conditions are still lacking, the condition of the cleanliness of the production room from time to time is sometimes cleaned. The road where there is dust and there are still puddles of water around the ditch. The results of the interviews were conducted by household industry owners and production site workers. There is a trash can, but it doesn't have a cover. This causes the vector of polluted material to easily enter or be polluted.

The production building has an area of 4 x 6 m^2 which is used for the production of tofu. Regulation of BPOM in the 2012 year aspects of buildings and production facilities include floors, walls, ceilings, doors, ventilation, windows, and lighting. From this aspect, the explanation meets the requirements. The lighting factor is obtained from direct sunlight. Some doors and windows do not exist, because the condition of the building is still open. Ventilation functions as a place for air exchange production of tofu, which is needed because of the presence of smoke in the process (BPOM RI, 2012).

Observations are still not clean and there are puddles of water at several points. This watery floor condition can cause people to slip easily, making it unsafe. In addition, waterlogged conditions can cause foot skin disorders due to dirty puddle water. This applies to the home industry because there are still many workers who do not use footwear or only wear sandals. For the walls of the room, some have been built. The ceiling of the room is strong and does not leak easily, but it is still dusty so still a risk today for processed tofu products. There are no doors and windows yet because the space is still opened.

A food handler if he does not pay attention to his hygiene starting from washing hands, hair, body, nails, wound care will facilitate the entry of bacteria into food so that processed food can be contaminated with work clothes and cleanliness of work clothes or aprons, food handlers should wear clothes work or apron. It is necessary to pay attention to the cleanliness of work clothes or aprons, because if the handlers during processing do not use work clothes or aprons,

the remnants of processing dirt will stick to the clothes, causing the clothes to become dirty and unhygienic and can cause the dirt to move to the processed food (Hasanah, 2013).

Based on the research, the quality of the tofu soaked water bacteriologically showed that it had not met the requirements or that the *Salmonella* test was positive, while the arsenic test was still in compliance with the quality standard of 0,0426 mg/l. Tofu soaking water is water that is used as a marinade for tofu that is sold. Tofu has a high water and protein content, this causes tofu to be easily damaged by bacteria. Tofu producers mostly sell their tofu submerged in water. Soaking water has the benefit of maintaining the texture of the tofu that is sold, so the tofu water used must meet the requirements of good clean water so that the quality of the tofu is maintained. The water source used for the tofu production process uses well water. *Escherichia coli* contamination, most likely due to contamination of water sources by dirt through a septic tank that is close to a water source (well) causing sewage to seep. In addition to the cleanliness of the workers, the less clean buckets used can also be the cause of the presence of *Escherichia coli*.

The cause of microbial contamination into tofu water processed by the home industry is the processing factor that does not pay attention to environmental hygiene and sanitation. The understanding of tofu water craftsmen in the home industry on the cleanliness of tofu water treatment can be said to be limited to knowing knowledge and has not yet reached a higher level of knowledge or understanding. This can be seen in the tofu water treatment process, which does not yet have hygienic and sanitation standards in its processing. In addition, the increase in the number of microbes during storage was caused by immersion that was not replaced, so that the microbes in the immersion could multiply properly.

Research by Ristiana, Evi (2016) the number of colonies of *Escherichia coli* in tofu water originating from the home industry is 29 colonies/ml. The number of *Escherichia coli* colonies in tofu water originating from tofu factories was an average of 4,75 colonies/ml. According to Asril, M and Leksikowati (2019), bacteria found in tofu soaking water produce protease enzymes, so they can hydrolyze proteins. The activity of microorganisms causes the hardness of tofu to decrease, and tofu becomes brittle. The fragility of the tofu causes the marinade to become cloudy so that the physical tofu which was originally solid decreases in density.

Personal hygiene is important for the prevention of contamination because humans are reservoirs for all kinds of disease agents. Workers with poor personal hygiene are susceptible to transmission from all types of bacteria such as *E. coli bacteria* (Antara, S. and Gunam, IBW (2002). Contamination of pathogenic bacteria such as enterotoxigenic *Escherichia coli* in food can cause serious problems (Oyofo, BA), Subekti D, Tjaniadi P, *et al*., (2002).

Personal hygiene of workers in the home industry is very necessary for food processing, knowledge of producers knows about personal hygiene needs to be improved. One way is to provide education to all workers about the importance of personal hygiene. In addition to individual hygiene, employees also need to be informed of the impact that can be caused by poor food processing. Subsequent efforts to improve the quality of food processing places. Food processing facilities are places where food is processed into processed food/finished food. This food processing place requires sanitation, both in terms of construction, available equipment and, arrangement of available equipment. Food requirements that are followed with the processing place/production area, such as the existence of an adequate supply of water and meeting health, because water is one of the transmission media for several water-borne diseases.

CONCLUSIONS AND SUGGESTIONS

The implementation of hygiene and sanitation standards in IRT is the aspect of worker hygiene (50,0%), while the environmental sanitation aspect is the location and production environment (50,0%) and buildings, production facilities (45,0%). Testing the quality of the tofu water bath through bacteriological and chemical tests. Tests that are not under the standard are *Escherichia coli.* Meanwhile, the examination of *Salmonella* and Arsenic is still below the quality standard.

The need for close assistance and supervision from health agencies, so the home industry is expected to further increase awareness of food handlers through communication, information, and education about hygiene and sanitation in the workplace, training for employees. In addition, it is recommended that regular laboratory checks on processed tofu products and water used to improve the quality of tofu are recommended.

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