

EVALUATION OF THE APPLICATION OF GOOD MANUFACTURING PRACTICE AND SANITATION STANDARD OPERATING PROCEDURES IN PRODUCTION PROCESS

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Abstract This study aims to evaluate the application of the basic requirements of food safety standard, namely GMP and SSOP during the production process. The observations method for data collection in this study was through interviews of workers and owners. Evaluate of GMP and SSOP was carried out to see the effectiveness of conformity and non-conformity measures in carrying out the production process. The results of this study stated that the conformity assessment of the evaluation of the application of GMP and SSOP obtained a value of 42.50%-84.00%, with a deviation value of 185 from the overall value of 528 which means deviations in the moderate level so that the application of the GMP is said to be less in accordance with the provisions of the Regulation of the Minister of Industry No. 75 of 2010. The conformity assessment of the application of the SSOP obtained a value between 20.00%-84.00%, with a deviation value of 45 from the overall value of 160 which means that the deviation is in a moderate level or does not meet the FDA's provisions regarding SSOP as stated by government regulation, Number 28 of 2004 concerning food safety, quality, and nutrition. The high rate of deviations in the application of GMP and SSOP indicates a low level of contamination prevention during the production process.

Keywords: GMP, SSOP, Rendang, Conformity, Non-Conformity

1. Introduction

West Sumatera is famous for being rich in food, especially culinary. Culinary specialties from this area are well known not only nationally and even globally. This culinary wealth is one of the attractions for tourists to come to West Sumatera. Unsafe food production can not only result in food poisoning, product recalls, lengthy legal proceedings, but can also damage the reputation of the public. Therefore, IKM of Food must meet the food safety requirements for its consumers. In law No. 8 of 1999 concerning Consumer Protection, Chapter III Article 4 states that consumer rights are the right to comfort, security and safety in consuming goods and or services. Rendang is one of the traditional foods of West Sumatera that has begun to go global and according to CNN has become the best food in the world. This results in the need to produce rendang with food safety standards, quality assurance including the safety of products for consumption is very important. In this regard, the Minister of Industry of the Republic of Indonesia has set guidelines for the good manufacturing practice (GMP) [1] regulated in the regulation of the Minister of Industry No. 75.

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The year is 2010. Likewise, it is also explained in the Government Regulation of the Republic of Indonesia, No. 28 of 2004 concerning the safety, quality, and nutrition of food is the conditions and efforts carried out to prevent biologically, chemically, and other polluted food that will harm, interfere with, and endanger human health. One way to ensure that the food produced is safe for health with guaranteed hygiene is to pay attention to sanitary factors and the absence of contamination of food. The application of good manufacturing practices (GMP) and Sanitation Standard Operating Procedure (SSOP) is needed to prevent food contamination that can cause foodborne disease [2][3]. The implementation of GMP is carried out through 3 stages starting from a preliminary survey, observing 18 aspects of GMP and providing suggestions for improvement, there is an important thing that must be owned by the food industry, namely sanitation. Sanitation is a set of processes that are carried out to maintain cleanliness. Sanitation is carried out as an effort to prevent diseases / accidents from food consumption produced by eliminating or 3 controlling factors in food processing that play a role in the transfer of hazards from the receipt of raw materials, processing, packaging and warehousing of

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products until the final product is distributed [4][5]. Sanitary principles to be applied in the SSOP are grouped into 8 keys as the main requirements for sanitation and its implementation, namely (1) water safety, (2) condition and cleanliness of surfaces in contact with foodstuffs, (3) prevention of cross-contamination, (4) maintaining handwashing, sanitation and toilet facilities, (5) protection from contaminants, (6) labeling, storage and correct use of toxins, (7) monitoring the health condition of personnel that can result in contamination (8) eliminating pests from the treatment unit [6] In addition to paying attention to raw materials and processes, controlling good production facilities [7], it is also important to implement SSOP which focuses on maintaining hygiene from the start of the production process until the product is marketed [8][9][10]. One of the rendang producers located in the city of Padang, West Sumatera. Rendang produce use beef every month reaching 50-80 kg. In carrying out the process of processing rendang is still very simple where it is made with the basic ingredients of meat, coconut milk and various spices, then cooked for a long time until it becomes dry and dark brownish in color and even until it is blackish. However, rendang is one of the foods that has the potential to be chemically, biologically, and physically polluted [11][12][13]. Potential sources of contamination in rendang meat, namely during the process of preparing ingredients, cooking, and the process after cooking, especially during storage and packaging. Contamination during the processing process can be caused by an unclean environment or caused by workers. Another source of contamination is the condition of the rendang production site. The purpose of this study was to evaluate the application of food safety standards in the application of GMP and SSOP in the rendang production process starting from the preparation of ingredients, the process of production, storage, and packaging.

2. Method

This This research was carried out at the product located on West Sumatra. Data collection is carried out by visiting the rendang production site, starting from preparation, processing and packaging, data is collected through observation, interviews, and questionnaires, then assessments and documentation are carried out. Interviews and

questionnaires are conducted to business owners and employees. During data collection and observation, documentation in the form of photos is carried out, to become evidence. The application of GMP is examined based on the regulation of the Minister of Industry No. 75 of 2010 and Government Regulation of the Republic of Indonesia Number 28 of 2004 concerning food safety, quality, and nutrition. The application of SSOP was examined based on the research of Triharjono [6]. The data obtained are then compared with field conditions and supposed conditions, and analyzed descriptively using tables and explained in narrative form. According to [14] [15][16] the formula used to obtain the conformity value of the application of GMP and SSOP with the number of aspects in accordance with the specified conformity points are :

$$Y = (n_0 \times 0) + (n_1 \times 1) + (n_2 \times 2) + (n_3 \times 3) + (n_4 \times 4)$$

Where:

Y = total value of the application obtained

n₀ = number of aspects with a value of 0 in the assessment table

n₁ = number of aspects with a value of 1 in the grading table

n₂ = number of aspects with a value of 2 in the scoring table

n₃ = number of aspects with a value of 3 in the assessment table

n₄ = number of aspects with a value of 4 in the scoring table

Valuation:

0 = deviation that occurs 0% (the application meets)

1 = deviation that occurs 1-25% (the application is sufficiently met)

2 = deviations that occur 26-50% (the application is less fulfilling)

3 = deviations that occur 51-75% (application is very poorly met)

4 = deviation that occurs > 75% (the application does not meet)

The total value of the application obtained (Y) is then adjusted to the percentage scale that has been determined based on the full value on the points to obtain the classification of applications at the production site, namely :

80-100% = conformity value of GMP implementation aspect meets

60-79% = conformity value of aspects of GMP application sufficiently meets

40-59% = conformity value aspects of GMP application are less meet

20-39% = conformity value aspects of GMP application are very poorly met
 0-19% = conformity value of GMP implementation aspect does not meet

3. Results

3.1 Location

The location and environment where the production process of IKM has a sufficient value of meeting, namely with a GMP application value of 78.52%. The environment around the production building is neatly arranged, not in an area prone to flooding and no standing water. However, around the production site there are housing and shops and to get to the production place it is easy to pass. The location and environment around the production building are well maintained, must be clean and free from sources of pollution. This can be seen in Table 1.

Table 1. Location and environment production process

No	Parameters	Valuation				
		0	1	2	3	4
1.	Factories/production sites away from polluted environments	√				
2.	The road to the factory has no dust and puddles	√				
3.	The production environment is clean and there is no waste	√				
4.	The factory is not in an area that is easily flooded/flooded	√				
5.	Free from bushes or pest nests	√				
6.	Away from public landfills, sewage, slums, and junks		√			
7.	The environment outside the factory is not used for production activities	√				

In table 1, it can be seen that for the parameters of the location and environment of the production site the deviation that occurs is 0% meaning that the application is sufficiently fulfilled except for the parameters away from public landfills, waste, slums and rongsokaan walukaan walupun there is a deviation of about 25% but in its application it is quite fulfilling.

3.2 Building

The building of the production unit must have a basic room and a complementary room. The main room consists of a goods reception room, a production room, and a storage room, while the complementary room consists of a toilet, a work room, and a dining room. Overall the assessment of production buildings was 47.58% and was categorized as very insufficient.

The production building consists of a production room (staple room) which is divided into a material preparation room and rendang cooking room, a production product storage room, a packaging room and an equipment storage room (complementary room). The arrangement of the room is in accordance with the production process the raw material storage room, cooking room and finished product storage room are separated and arranged in order, but between the goods receipt room and the production room is limited by fabrics that are less effective at limiting between rooms, thus allowing cross-contamination. The floor in the preparation and cooking room is made of cement and forms elbows, ventilation is enough to guarantee good air circulation and can remove steam, gas, smoke, odors, dust and heat that arise during processing that can harm the health of employees. This can be seen in table 2.

In table 2, it can be seen that for the building parameters, the deviation that occurs is 0% meaning that the application is sufficient to meet the waterproof production floor, the washing floor has a sufficient slope including bathrooms, toilet hand washing themes and waterproof production floors, while for the surface of the inner production wall there is a deviation of about 25% but in its application it is quite fulfilling. Likewise, the case for the floor and walls does not form an elbow angle that can hold water or dirt and has a deviation of about 35% with the meaning of the word application is not fulfilling.

3.3 Sanitation

Sanitation facilities are factors that must be considered, especially the availability of clean water, garbage disposal, wastewater treatment, and soil pollution. Sanitation facilities as a whole are less than meeting the application value of 62.43%. The water source comes from groundwater that is drained using pipes and is in good condition. The water used for the treatment process is in the form of running water, water is

not cloudy, odorless, and colorless. However, no checks were carried out for the standard parameters of the water quality used.

Table 2. Building of IKM

No	Parameters	Valuation				
		0	1	2	3	4
1.	The production floor is waterproof, resistant to salts, bases, acids/other chemicals, flat surfaces, non-slippery and easy to clean	√				
2.	The floor of the washing place has a sufficient slope so that it facilitates the flow of water	√				
3.	The floor and walls do not form right angles that can hold water or dirty.			√		
4.	Bathroom floors, hand washing stations and toilet facilities have a sufficient slope so that they do not cause puddles and smell.	√				
5.	Walls made of non-toxic materials.	√				
6.	The surface of the walls of the inner production room is made of smooth, flat, light-colored, durable, not easy to peel off and easy to clean material		√			
7.	The production floor is waterproof, resistant to salts, bases, acids/other chemicals, flat surfaces, non-slippery and easy to clean.	√				

The waste generated from rendang production is mostly in the form of solid waste. The solid waste produced is in the form of coconut shells derived from the material preparation process, while the waste produced during the processing process is firewood charcoal collected in one place and resold. The resulting liquid waste such as material washing water and washing water for production tools are flowed through existing waterways. This can be seen in table 3.

In table 3, can be seen that for the sanitation parameters, the deviation that occurs is 45% meaning that the application is not sufficient, such as water used for the production process is in direct contact with processed foodstuffs and does not have a separate system with water for consumption or daily drinking water in the household.

3.4 Production Equipment

The production equipment used during the processing process must meet the standards, namely in terms of engineering, non-toxic, quality and hygiene, rust-resistant, easy to maintain, strong, does not absorb water, does not peel, clean, and sanitize [17][18]. The equipment used during the production process has a value of 71.35% which means it is quite fulfilling. Production tools that are in direct contact with materials are made of good materials and function as they should. Likewise, for hazardous material waste, it does not yet have its own container, but other wastes already have a disposal container so that it does not pollute the product. As for the hot water supply is not yet available on the indispensable thing to dissolve the remnants of fat and help clean the equipment. This can be seen in table 4.

In table 4, can be seen that for the parameters of production equipment the deviation that occurs is 25% meaning that the application is sufficient to meet such as machinery and equipment according to the type of production, the equipment does not cause pollution to the product by the body of the sonic, metal materials that are detached from the machine / equipment, lubricating oil, fuel. For the parameters of the machine / equipment is not supervised, checked and monitored because the technicians for this equipment are not yet there and the IKM needs the services of a third party and costs a lot of money for one maintenance of machinery and production equipment.

3.5 Material

Those used for raw materials and additives to produce rendang must use materials that are in accordance with applicable quality standards and do not harm or harm the health of consumers.

Table 3. Sanitation

No	Parameters	Valuation				
		0	1	2	3	4
1.	Water supply facilities (well water or PAM water) are equipped with water reservoirs and pipes to drain water.	√				
2.	Water used for the production process and experiencing direct contact with processed foodstuffs meets the requirements of clean water quality	√				
3.	Water that is not used for the production process and does not experience direct contact with processed foodstuffs has a separate system with water for consumption or drinking water			√		
4.	The piping system is distinguished between drinking water or water that is in direct contact with processed foodstuffs with water that is not in direct contact with processed foodstuffs, for example with different signs or colors.			√		
5.	Water and waste disposal consists of liquid, semi-solid/solid waste disposal facilities	√				
6.	The sewage and sewage system is designed and constructed so as to prevent the risk of pollution of processed food, drinking water and clean water.		√			
7.	Containers for hazardous material waste, made of strong materials, marked and tightly closed to avoid the occurrence of spills that can contaminate the product.		√			
8.	Cleaning facilities are equipped with clean water sources and if possible can be equipped with hot and cold water supplies. Hot water is useful for dissolving the remnants of fat and for the purpose of disinfection of equipment.		√			
9.	The food processing industry has employee hygiene facilities such as facilities for hand washing, clothing change facilities and work shoe rinse facilities.			√		
10.	Change of clothes facility to replace clothes from the outside with work clothes equipped with a separate place to store / hang work clothes and outerwear			√		

Table 4. Production Equipment

No	Parameters	Valuation				
		0	1	2	3	4
1.	Machinery and equipment according to the type of production	√				
2.	Does not cause pollution to products by mechanical remains, metal materials that are detached from machinery / equipment, lubricating oil, fuel and other materials that pose a danger.	√				
3.	Easy cleaning, disinfection and maintenance to prevent pollution of processed foodstuffs	√				
4.	Laid out according to the sequence of processes so as to facilitate good hygiene practices and prevent cross-contamination	√				
5.	Ease of maintenance, cleaning and washing	√				
6.	Machinery/equipment must always be monitored, checked and monitored to ensure that the processed food production process is in accordance with the established requirements.		√			
7.	Machinery/equipment can be equipped with moisture regulatory and control devices, airflow and other equipment that affects the safety of processed food	√				
8.	The material of machine tools / equipment made of wood is ensured how to clean it that can guarantee sanitation	√				
9.	The measuring instruments contained in the machine / equipment should be ensured for accuracy		√			

The materials used during the production process consist of two materials, namely raw materials and packaging materials. The raw materials used consist of meat, coconut milk, red pepper, garlic, onion, and salt. Meat is purchased at slaughterhouses, coconut milk is purchased by customers and other ingredients purchased in the market. The raw material and auxiliary material process has a value of 80.00% which means it meets the GMP requirements. This can be seen in table 5.

In table 5, it can be seen that for the parameters of raw materials and additional materials used in the production meets because the deviation that occurs is 25% meaning that the application is sufficient to meet, except for hot steam (steam) because it does not yet have an engine.

3.6 Application of Sanitation Standard Operating Procedures (SSOP)

Deviations that occur during the implementation of the SSOP will lead to environmental conditions that can result in cross-contamination of the product. In food producers, sanitation plays an important role which includes aseptic activities in the preparation, processing and packaging of food products, cleaning and sanitation of factories as well as the factory environment and the health of workers [19] [20][21]. The application of SSOP in the field along with the condition should be in the IKM, as shown in Table 6.

In table 6, it can be seen that in the application of SSOP in its application on average is 45% and has not met the requirements such as prevention of contamination, especially in the use of special production clothing is not available so that employees use clothing from outside such as clothes and sandals, this can contaminate the product because it is easily exposed to street dust and small dirt that sticks to clothes. Likewise, the use of labels, toxin ingredients to the point of pest prevention.

Table 5. Material

No	Parameters	Valuation				
		0	1	2	3	4
1.	The materials used are poured in the form of a basic formula that states the types and quality requirements of the ingredients	√				
2.	The material used is not damaged, rotten or contains harmful ingredients	√				
3.	The materials used are not detrimental or harmful to health and meet the quality standards or requirements set			√		
4.	The use of BTP (Food Additives) whose quality standards and requirements have not been established should have permission from the competent authority	√				
5.	Water that is part of processed food meets the requirements for drinking water or clean water in accordance with laws and regulations	√				
6.	Water used for washing/direct contact with processed foodstuffs, meets the requirements of clean water in accordance with laws and regulations		√			

Table 6. SSOP

No	Parameters	Valuation				
		0	1	2	3	4
1.	Water Safety	√				
2.	Surface Hygiene in Contact with Foodstuffs	√				
3.	Prevention of Cross-Contamination			√		
4.	Sanitation Facilities	√				
5.	Protection of foodstuffs from contamination	√				
6.	Labeling, use of toxin materials and proper storage		√			
7.	Employee Health Control		√			
8.	Pest Prevention		√			

3.7 Water Safety

The application of SSOP for the water aspect has a value of 65.00% which means it is quite fulfilling. The use of water for production purposes comes from PDAM Padang City. The water used for washing the tool comes from the same water. The quality of the water used is the quality of drinking water in terms of water color and water odor, the water used during the production process is also used as employee drinking water.

3.8 Surface Hygiene in Contact with Foodstuffs

The cleanliness of surfaces in contact with foodstuffs has a value of 47.50%, which means that it does not meet the SSOP. The equipment used is in clean and good condition, every time there is a malfunction of the tool will be immediately replaced with a new one. Sanitary measures in the activities of the production process are only carried out after the completion of production and are not carried out again before the production process[22]. No microbiological testing of the equipment has been carried out and there is no recording of the results of the examination.

3.9 Prevention of Cross-Contamination

To process rendang as food, it is necessary to pay attention to cross-contamination starting from the processing site, the state of employees, the separation between outerwear and special clothing of the production site. The application of cross-contamination prevention has a value of 56.00% which means that it does not meet the SSOP. Production-specific employee clothing is not available such as standard PPE and others so employees use clothing from outside such as clothes and sandals, this can contaminate the product because it is easily exposed to street dust and small dirt that sticks to the clothes. Employees only use aprons and head coverings provided, employees do not use jewelry, and do not smoke, but still chat, eat and drink at the production site.

3.10 Sanitation Facilities

The sanitation facilities that applied have a value of 42.00% which means that they do not meet the SSOP. Where there are handwashing facilities available in the required place, soap with running water is available, but changing clothes and other facilities are not yet available.

3.11 Protection of Foodstuffs from Contamination

Protection from materials suspected to be sources of contamination has a value of 76.67% or sufficiently meets the SSOP. During the production process, there are no non-food ingredients that have the potential to become adulterants. Foodstuffs and sanitary materials are stored separately. The bin is free of piles and is located not adjacent to the production process area, but the trash can has no lid.

3.12 Labeling, Use of Toxin Materials, and Proper Storage

Labeling in the rendang industry is very important so that appropriate handling and storage are carried out to ensure health security. The application to this aspect is sufficient to meet the SSOP (value 78.65%). There is no toxin material around the production room. The toxin material is stored in a separate room that is quite far from the production room and is labeled. The materials used met physical quality standards, but were not tested chemically and microbiologically.

3.13 Health Control

Employees here even though only 6 to 8 people are also carried out employee health checks. This is important to implement because employee health can be a source of contamination, but although employee health is very important to maintain cross-contamination, rendang producer does not conduct routine checks or employee health history. The value in this aspect is 20.20% or less meets the SSOP.

3.14 Pest Prevention

Pest prevention is carried out in the form of giving gauze wire to the ventilation walls to prevent mosquitoes from entering and for large animals to enter, such as mice. The vent is closed with gauze wire and does not use an air filter. Cleaning of the room is carried out every after production but without the use of disinfectants. Although the production room is semi-enclosed, there are no flies or other pests in the production site.

4. Conclusion

The results of this study stated that the conformity assessment of the evaluation of the application of GMP and SSOP obtained a value

of 42.50%-84.00%, with a deviation value of 185 from the overall value of 528 which means deviations in the moderate level so that the application of the GMP is said to be less in accordance with the provisions of the Regulation of the Minister of Industry No. 75 of 2010. The conformity assessment of the application of the SSOP obtained a value between 20.00%-84.00%, with a deviation value of 45 from the overall value of 160 which means that the deviation is in a moderate level or does not meet the FDA's provisions regarding SSOP as stated by government regulation, Number 28 of 2004 concerning food safety, quality, and nutrition. The high rate of deviations in the application of GMP and SSOP indicates a low level of contamination prevention during the production process.

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