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Product Quality of the Local Food Rempeyek in Palu City, Indonesia

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Abstract

Peanuts are one of the agricultural products that are a source of protein and vegetable oil. In Indonesia, peanuts are widely consumed and processed into complementary foods or snacks. Peanut cracker is a typical Indonesian food that is liked by all people. The main ingredient in making peanut brittle is using peanuts which have the potential for pathogen contamination. his study is a descriptive observational cross sectional study that aims to analyze GMP (Good Manufacturing Practice) and HACCP (Hazard Analysis Critical Control Point) in one of the SMEs (Small and Medium Enterprises) in Palu City with a product that is peanut brittle. GMP analysis was carried out using the Self-Assessment Questionnaire created by Food Supplement Europe and assessed on the Gutman scale. The results of the analysis show that UKM X still poor at <50% in implementing GMP. HACCP analysis shows that there is a CCP (Critical Control Point) in the process of making peanut brittle, namely during the frying process, peanut washing and sorting.

Keywords: Peanuts, Indonesian Food, Good Manufacturing Practices, Hazard Analysis Critical Control Point.

Introduction

Peanut (Arachis hypogaea L.) is one type of food product in agriculture in Indonesia which has an important value, namely as a source of protein and vegetable oil (Kurniawan, et al., 2017).

In general, peanuts in Indonesia are consumed as snacks that are fried or boiled and not infrequently also become mixed ingredients in various processed foods (Sumarno, 2015). Peanut cracker (peanut cracker) is one of the typical Indonesian foods that are very popular with the people of Indonesia. This food is included in the fried food group which is often used as a side dish or snack (Ulya & Rusman, 2012).

The high interest of the Indonesian people towards this special food has encouraged many small and large-scale food business actors to choose to sell peanut brittle. However, there are still things that are often forgotten by food business actors that contaminated food can be a medium for disease transmission or also known as foodborne disease (Herman, et al., 2015).

World Health Organization (WHO) in 2010 estimated that as many as 31 types of foodborne diseases caused more than 600 million diseases and 420,000 deaths in the world (Havelaar, et al., 2015). Every year it is estimated that as many as 100 million people living in Middle Eastern and North African countries suffer from foodborne diseases, 32 million of whom are children under the age of 5 years (WHO, 2015).

In 2019 there were 6,205 poisoning incidents in Indonesia, 474 of which occurred due to food poisoning and most of the incidents occurred

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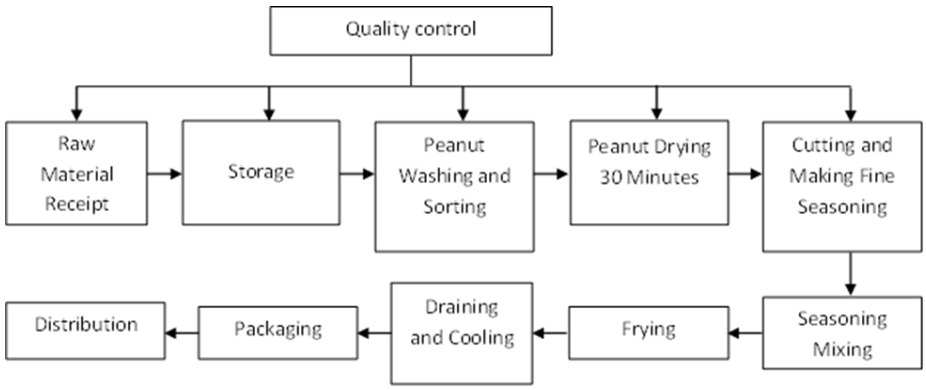

Chart 1. Process Flow of Peanut Rempeyek UKM X

due to contamination of household processed food as many as 265 cases (BPOM, 2020). Referring to the Law of the Republic of Indonesia Number 18 of 2012 concerning Food, the state is obliged to realize the availability, affordability, and fulfillment of food consumption that is sufficient, safe, quality, and nutritionally balanced for all Indonesian people. Based on the law, the state needs to consider an effort that can assist in preventing and overcoming food safety problems in Indonesia.

One of the efforts that can be done is by implementing a system designed to prevent problems in order to ensure the food products produced are safe for consumption or commonly known as HACCP (Hazard Analysis and Critical Control Point). HACCP is a risk management system that aims to identify, evaluate and control biological, chemical and physical hazards related to food safety in the entire food supply process (Singh et al., 2018).

In addition to implementing HACCP in a food business unit, it is also necessary to apply GMP (Good Manufacturing Practice) to ensure the quality of the food products produced remains consistent until it reaches consumers (Dewanti & Hari-

Table 1. Product Description and Its Usage

PRODUCT DESCRIPTION	
Company Name	**SMEs X**
Characteristics Summary	
Product Description	**Organoleptic Characteristics:** Texture/Physical: Crispy Color: Golden Chocolate Fragrant : Peanut and Herbs Taste : Savory
Composition	Peanuts, starch, wheat flour, lime leaves, eggs, garlic, candlenut, coriander, seasoning (masako), MSG, salt, water
Processing Unit Capacity	6 kg/day
Usage Requirements	The product should be stored in a dry place and not exposed to direct sunlight, stored in a closed container
Transport/Packaging Condition	The product is packaged in a plastic that has been made airtight
Product Usage	
This product can only be consumed by children who already have teeth to adults who do not have a history of allergies to peanuts	
Place of Sales	Market

Table 2. GMP Analysis

Good Manufacturing Practices (GMP) Indicators	The number of Questions	The number of Answers "Yes"	GMP Score
Primary Production			
Production Process	59	37	37/59 x 100% = 0.62 = 62%
Recovery and Rework	11	2	2/11 x 100% = 0.18 = 18%
Food Product and Development Process	9	1	1/9 x 100% = 0.11 = 11%
Design and Facilities			
Room and Equipment Place	59	35	35/59 x 100% = 0.59 = 59%
Operation Control			
Quality Management	17	9	9/17 x 100% = 0.52 = 52%
Hazard Analysis Critical Control Points (HACCP)	7	0	0/7 x 100% = 0 = 0%
Laboratory testing	13	3	3/13 x 100% = 0.23 = 23%
Documentation	25	1	1/25 x 100% = 0.04 = 4%
Maintenance and Sanitation			
Storage	18	11	11/18 x 100% = 0.61 = 61%
Personal Hygiene			
Personal Inspection (self-check-up)	6	1	1/6 x 100% = 0.16 = 16%
Transportation			
Transport and Distribution	15	11	11/15 x 100% = 0.73 = 73%
Product Information and Customer Awareness			
Complaint Procedures, Product or Food Withdrawals and Emergency Procedures	15	0	0/15 x 100% = 0 = 0%
Stability and Storage Age	15	6	6/15 x 100% = 0.4 = 4%
Training			
Personnel and Training	23	3	3/23 x 100% = 0.13 = 13%
Sub Contract Operations (Cooperation Contract as Partner)	11	0	0/11 x 100% = 0 = 0%
GMP UKM X Results	**303**	**120**	**120/303 x 100% = 0.39 = 39%**

yadi, 2013). Currently peanut brittle is very easy to find in Indonesia, even many restaurants that provide peanut brittle as an additional menu and always attract consumers' interest. Peanut cracker produced by UKM (Small and Medium Enterprises) X is one of the peanut brittle products in Palu City, Central Sulawesi and has received a distribution permit from BPOM (Food and Drug Supervisory Agency). Based on some of these background descriptions, this is the basis for conducting a GMP and HACCP analysis on peanut brittle products owned by UKM X.

Method

This research is an observational descriptive study that aims to test the application of GMP and HACCP in one of the SMEs in Palu City with a product in the form of peanut brittle. This study observes

Table 3.Hazard Analysis and Identification of CCPs

Process	Hazard (Biology (B)/ Physics (P)/ Chemistry (C))	Hazard Sources	Potential Hazard			Preventive measures	Decision Tree				CCP / Not CCP
			Probability	Severity	IR		Q1	Q2	Q3	Q4	
Raw Material Acceptance	**B**: Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	People and raw materials	3	4	Increased Risk	Careful selection of raw materials by determining several criteria. Checking the cleanliness of the vehicles used to transport raw materials and the cleanliness of the recipients of raw materials.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, pesticide residue	Raw materials	2	4	*Lower Risk*	Acceptance of raw materials is only done on good quality raw materials	Y	N	Y	Y	Not CCP
	Q:Dust, gravel	Raw materials	1	1	*Satisfactory Risk*	Suppliers control the cleanliness of raw materials sold	N	-	-	-	Not CCP
Storage	**B**: Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	People and raw materials	3	4	Increased Risk	Checking the cleanliness of the recipient of raw materials. Separation of raw materials that can cause cross-contamination.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, pesticide residue	Raw materials	2	4	*Lower Risk*	Checking the cleanliness, humidity, temperature and air circulation of the storage area	Y	N	Y	Y	Not CCP
	Q:Dust, gravel	Raw materials	1	1	*Satisfactory Risk*	Raw materials are cleaned first before storage	Y	N	Y	Y	Not CCP
Peanut Washing and Sorting	**B:** Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	People, raw water and containers	3	4	Increased Risk	Personal hygiene. Water quality checking. Checking the cleanliness of the containers used when washing raw materials.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, pesticide residue	Raw materials	2	4	*Lower Risk*	Washing raw materials with clean running water. Selection of peanuts with good quality and discard the damaged ones.	Y	Y	-	-	CCP
Peanut Drying	**B:** Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	People, raw materials and the open environment	3	4	Increased Risk	Drying is done while paying attention to the cleanliness of the handlers and the environment around the drying process	Y	N	Y	Y	Not CCP
	C: Aflatoxin, pesticide residue	Raw materials	2	4	*Lower Risk*		Y	N	Y	Y	Not CCP
	Q: Dust	Air	1	1	*Satisfactory Risk*		Y	N	Y	Y	Not CCP
Cutting and Making Fine Seasoning	**B:** Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	People, raw materials, knives, cutting boards and containers	3	4	Increased Risk	Application of personal hygiene to handlers. Regular checks on the cleanliness of the tools used for cutting and grinding spices.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, pesticide residue	Raw materials	2	4	*Lower Risk*		Y	N	Y	Y	Not CCP
	Q: Dust	Raw materials	1	1	*Satisfactory Risk*		Y	N	Y	Y	Not CCP
Seasoning Mixing	**B:** Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	People, raw materials, water, mixing spatula and container	3	4	Increased Risk	Application of personal hygiene. Use clean cooking utensils. Water quality checking.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, pesticide residue, MSG (Monosodium Glutamate)	Raw Materials and Food Additives (BTP)	2	4	*Lower Risk*	Do not use food additives excessively	Y	N	Y	Y	Not CCP
	Q: Dust and egg shells	Air and eggs	1	1	*Satisfactory Risk*	Crack the eggs first in a separate place and make sure no egg shells are followed	Y	N	Y	Y	Not CCP
Frying	**B:** Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	People, raw materials, water, mixing spatula and container	3	4	Increased Risk	The use of the right and stable temperature during the frying process. Check the cleanliness of the tools used. Personal hygiene.	Y	Y	-	-	CCP
	C: Aflatoxin, MSG (Monosodium Glutamate), trans fatty acids	Peanuts, BTP and cooking oil	2	4	*Lower Risk*	Regularly change the oil used for frying. The addition of BTP must be limited and follow according to SNI (Indonesian National Standard)	Y	Y	-	-	CCP
	Q: Egg shell	Egg	1	1	*Satisfactory Risk*		Y	N	Y	Y	Not CCP

Draining and Cooling	**B:** Staphylococcus aureus, Bacillus cereus	Humans and containers	1	4	*Satisfactory Risk*	Application of personal hygiene.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, MSG (Monosodium Glutamate), trans fatty acids	Peanuts, BTP and cooking oil	2	4	*Lower Risk*		Y	N	Y	Y	Not CCP
	Q: Egg shell	Egg	1	1	*Satisfactory Risk*		Y	N	Y	Y	Not CCP
Packaging	**B:** Staphylococcus aureus, Bacillus cereus	Humans and containers	1	4	*Satisfactory Risk*	Application of personal hygiene. Check the cleanliness of the containers used in packaging.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, MSG (Monosodium Glutamate), trans fatty acids	Peanuts, BTP and cooking oil	2	4	*Lower Risk*		Y	N	Y	Y	Not CCP
	Q: Egg shell	Egg	1	1	*Satisfactory Risk*	Discard the egg shells contained in the product.	Y	N	Y	Y	Not CCP
Distribution	**B:** Staphylococcus aureus, Bacillus cereus	Humans and containers	1	4	*Satisfactory Risk*	Application of personal hygiene. Checking the cleanliness of the vehicles used for product distribution.	Y	N	Y	Y	Not CCP
	C: Aflatoxin, MSG (Monosodium Glutamate), trans fatty acids	Peanuts, BTP and cooking oil	2	4	*Lower Risk*		Y	N	Y	Y	Not CCP

all production steps based on the aspects of the scope of GMP and HACCP. GMP assessment using a questionnaire "Self-Assessment Questionnaire on Good Manufacturing Practice" published by Food Supplements Europe and rated on the Gutman scale. This research is located in a building owned by UKM X which is one of the peanut brittle producers in Palu City. The average amount of peanut brittle that can be produced by UKM X in a day is 6 kg.

Result

UKM X is a household business that produces several types of complementary foods or Indonesian snacks such as fried onions, banana chips and peanut brittle. This food business has been established since 2007 and is located in Palu City, Central Sulawesi. The product description that will be made in the GMP and HACCP analysis only focuses on peanut brittle, as presented in table 1.

Table 2 shows the total score of the GMP analysis results in UKM X, which is 39%. Based on the Gutman scale, SMEs X can be categorized as lacking in implementing GMP in their business units. The five GMP indicators, namely production process, room and equipment place, quality management, storage, and transport and distribution, scored between 51% - 75%, which means that it is sufficient to apply GMP. While the other 10 GMP indicators scored between 0% - 25%, which means that UKM X did not apply GMP to the 10 indicators in its business unit.

Discussion

The GMP analysis conducted on UKM X shows that of the 15 GMP indicators there are 10 indicators that are lacking by UKM X with a score <50%, namely Recovery and Rework, Food Product and Development Process, HACCP, Laboratory

Table 4. HACCP Plan Data Sheet

STEP/ CCP Principle 2	***Hazards (B/C/P) Principle 1***	***Parameters of CCP***	***Critical Limit Principle 3***	***Target Value***	***Monitoring Principle 4***	***Corrective Action Principle 5***
Peanut Washing and Sorting	**C:** Aflatoxin, pesticide residue	Water quality, time and peanut quality	Wash with clean and running water with time of 5 minutes	Wash with clean and running water with time of 10 minutes	What : Chemical Hazards How : Using clean water sources and checking water quality When: During the washing process Who : Workers on duty	The addition of food grade soap when washing. Sorting peanuts was repeated 2 times.
Frying	**B:** Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp.	Temperature and Time	Optimum frying temperature 100 oC – 125 OC with a time of 10-15 minutes	180 °C with a long frying for 5 minutes	What : Biological Hazards How : Recording temperature using thermometer and time using stopwatch or timer When: During the frying process Who : Workers on duty	Re-frying products that are still not ripe
	C: trans fatty acids			The use of cooking oil is only done 2 times / production	What : Chemical Hazards How: Oil is changed every 2 times frying When: During the frying process Who : Workers on duty	Do not use oil that has turned black for frying. Do not take burnt products to market.

Testing, Documentation, Personal Examination independent), Complaint Procedure, Product or Food Recall and Emergency Procedure, Stability and Storage Life, Personnel and Training, and Sub-Contract Operation (Cooperation Contract as Partner). In these 10 indicators, there are 3 GMP indicators that are not implemented at all by UKM (0%) namely the implementation of HACCP, complaints procedures, product recalls and complaints emergency procedures, and sub-contract operations. The owner of SME X said that until the time the research was conducted there had been no complaints, they had not entered into a contract with any party and the internal limitations of UKM X were funds, resources and other facilities, so they did not apply the three indicators. The application of the three GMP indicators is still minimally applied in the food business in Palu City. This study is in line with previous research conducted on fried onion products UD X (Yusma, et al., 2018) and Kaledo Warung X (Yusma, et al., 2021) in Palu City.

Meanwhile, UKM X in the results of the GMP analysis shows that it has adequately implemented GMP on management quality indicators (52%), buildings and equipment premises (59%), storage (61%), manufacturing (62%), and transportation and distribution indicators (73). %). The building and place for equipment in UKM X are considered to be quite good because they are separated from the production room and the ventilation is provided with safety. Ventilation needs to be protected to prevent insects and airborne dirt from entering the room which can interfere and damage the stored material (Rini, et al., 2015).

The results of the HACCP analysis on peanut brittle products belonging to UKM X indicate that there are several dangers of contamination that may arise during the production process. Contamination consists of biological contamination in the form of:Escherichia coli, Listeria spp., Salmonella spp., Staphylococcus aureus, Aspergillus spp., and Bacillus cereus. This is common because microorganisms can be found easily both in soil, air and water so it is difficult to avoid microorganism contamination (Rudiyanto, 2016). Aspergillus spp. is a fungus that often contaminates peanuts and can cause health problems (Wild & Gong, 2010).

The physical contamination found during the process of making peanut brittle from UKM X was in the form of dust and gravel carried from the raw materials during the reception process. This kind of physical contamination is common, especially when raw materials are procured directly from suppliers. In general, physical contamination can be removed through the washing process (Fakhmi, 2014).

While the chemical hazard found during the product manufacturing process is the presence of BTP in the form of MSG, where in the process of making peanut brittle, UKM X uses two different types of MSG. The frying process using cooking oil also has the potential to cause chemical hazards in the form of trans fatty acids. The use of cooking oil repeatedly will increase the levels of trans fatty acids in the resulting food products (Astuti, 2019). This will certainly have an impact on human health and can trigger heart disease (Densi, et al., 2017).

The results of CCP identification show that there are two processes in the manufacture of peanut brittle belonging to UKM X which are classified as CCP. The two processes are the washing and sorting of peanuts, and the frying process.

The washing process using water with several techniques can be one method that can help in reducing pesticide residues on agricultural products (Fitriadi & Putri., 2016). One method that is quite effective is washing with running water for a certain time (Bonnechre, et al., 2012).While sorting peanuts can minimize chemical contamination in the form of aflatoxins that can arise from peanuts that have been contaminated with fungi by only taking good quality peanuts. Most of the aflatoxins found in peanuts come from small, moldy, wrinkled seeds (Turner et al., 2005).

The frying process is one of the CCPs because in this process biological contamination can be removed or reduced. This is in accordance with the research of Triyanni, et al. (2017) which states that the frying stage is CCP1. Salmonella spp is one

of the bacteria that often contaminates processed peanut products (Chang et al., 2013). However, these bacteria are heat sensitive bacteria and their growth can be inactivated at 71°C for a few seconds (Carrasco et al., 2012).

Conclusion

UKM X GMP in running its business and still has not implemented the HACCP system in the peanut brittle production process. In the production process, the washing and sorting of peanuts and the frying stage are important CCPs in helping to control contamination hazards, whether they are biological, physical, or chemical hazards.

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