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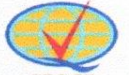
VOLUME 275 – 2019

3–2 October 2018
Assome, Italy

EDITOR
Enrico Pitta Tomassini

The open access journal for conference proceedings

iopscience.org/jpc



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Nomor : **559/UW-FP/PD-10/2018**

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NIK : 230 50 0084
Jabatan Akademik: Lektor Kepala

Menugaskan Dosen di bawah ini:

Nama : Prof. Dr. Ir. I Gde Suranaya Pandit, MP
NIK : 230 50 0041
Jabatan Akademik: Guru Besar

Sebagai Pemakalah; **46th International Conference on Sustainable Agriculture, Food and Energy.**
Tempat dan waktu pelaksanaan; **Manila-The Philipines, 18-21 Oktober 2018.**
Judul; **Hygiene and Sanitation of Pindang Processing in Central of Pemindangan, Bali.**

Demikian surat tugas ini dibuat untuk dilaksanakan sebagaimana mestinya.

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Hygiene and Sanitation of Pindang Processing in Central of Pemandangan, Bali

P. A. N. K. Permatananda¹, I. G. S Pandit², I K. Irianto²

¹Faculty of Medicine and Health Science Universitas Warmadewa. Faculty of Agriculture Universitas Warmadewa. Corresponding author*: nayakasih@gmail.com

Abstract. Food and beverage hygiene is an effort to control the factors of places, equipment, people and foods that may cause health problems and food poisoning, including fish. Fish is a food that is widely consumed by the public, but on the other hand, fish experience the process of decay faster. In order to inhibit decay and increase product diversity, the villagers of Kusamba in Bali conduct a traditional fish processing, that's called pemandangan. The raw material of pindang is usually the fishes that fall under the biological family scromboidae and that are very easy to decay due to high of protein content and environmental conditions. Pindang is a traditional product that is highly favored by the people of Bali because of its unique taste, so that hygiene and sanitation in its processing is needed to prevent the occurrence of fish poisoning. This study was a descriptive survey in order to get an description the state of the hygiene and sanitation behavior in the fish processing of central pemandangan in Bali and our effort to increase the hygiene and sanitation there. We found that some variables of hygiene and sanitation in central pemandangan of Kusamba were not eligible with the principles of hygiene and sanitation stated to the regulation of Sea Food HACCP, especially for the physical facilities and infrastructure. For the fisherman, we also found that they didn't have good knowledge about hygiene and sanitation. Next time, we hope that there will be a comprehensive intervention related to infrastructure which will eventually affect the quality of pindang.

1. Introduction

Fish are one of most essential nutrition sources which contribute significant aspects to humans' lives. Fish have been used as one of food sources since centuries ago. As a food source, fish contain main nutrition in the form of protein, fat, vitamin, and mineral. The protein from fish provides approximately 2/3 of the total amount of animal protein needed humans. The protein from fish is relatively large, weighing by 15-25% of a 100-kg fish meat. The amount of protein contained in red fish meat is higher than it is in the white fish meat. The amount of mineral in fish meat is not that much. Fish are also considered as the sources of calcium, iron, copper, and iodine [1]. The rate of fish consumption in Indonesia has recently increased by 33 kg/year/capita, which is expected to be achieved from national products. The Ministry of Marine and Fishery set the target of fish product to reach 22 million per year [2].

Despite the fact that fish are largely preferred by a wide variety of consumers, they are products which are fast to become rotten due to several certain things like high level of protein, the situation of environment, temperature, acidity, oxygen, the duration in which the fish are stored, and cleanliness [3]. There are a number of fish processing methods which are applicable to maintain the rate of fish quality, as well as increase the economic value of the product. These methods include canning process, fumigation process, salting process which is followed by drying process or a boiling process called as "pemandangan". The process of "pemandangan" is a fish processing method utilizing the salting method in attempt to eliminate decomposing bacteria and any enzyme activities. This method consists of several



steps, initiated from cleaning the selected fish, placing them on bamboo baskets, and boiling all the fish which have been greased with salt in the water at 100 degrees Celsius for 30 minutes [3-4]. The final product coming out from this fish processing method is more preferably consumed by the consumers due to its distinct taste not being too salty.

The "pemindangan" process comes in wide varieties, influenced by local culture of the place which implements this process. The principle of this process is however, the same in general. The chosen spot for the this "pemindangan" process is built on a 2296 and 50 meter square land which can house approximately 77 "pemindangan" processes at once. The needs of fish in Kusamba village has reached 20 tons per day. The harvesting process is not only conducted by fishermen in Kusamba village, but also those who are from Amed-Karangasem, Tanjung Benoa, Kedonganan, Ambengan, Banyuwangi, and Lombok. In year 2007, Dawan District, Klungkung Regency was dubbed as the Central "Pemindangan" Process, in accordance with the verdict concerning the development location of Central Fish Processing Product Number KEP.01/MEN/2007, released by The Ministry of Marine and Fishery in 2007. On the contrary, there are still many unexpected occurrences in the implementations, which are mainly related to the hygiene, drainage which is full of waste which leads to incompressible flow of water and bad smell; sanitation which does not meet the requirement which results in the product quality.

The "pemindangan" process in Kusamba village is far away from modernizations as the tools used in the process are still conventional. This results in poor sanitation and hygiene as shown by the fact that the fish are placed on dirty places, or that the easily-rusty drums are still used to store the fish. The salting process utilizes regular brown salt which is dirty. The water used to boil the fish is close to where the waste is directed. The boiling process is performed continuously up to the point where the main ingredients are out of stock. The drainage which functions to flow the waste is full of garbage which releases bad smell. These things are predictable due to the fact that the knowledge, manner, and attitude towards the the understanding of sanitation and hygiene shown by people involved in this "pemindangan process" are only oriented on the availability of "pindang" stock, ignoring the quality and hygiene of product. The poor quality and hygiene of this "pindang" product are then responsible to the many food poisoning cases in the society. Extreme Event Records concerning diarrhea in Karangasem in 2010 was said to have been triggered by the pathogen e.coli spreading out from the "pindang" product [5]. This article aims to provide the visions of hygiene and sanitation at the largest Central "Pemindangan" in Bali, as well as the report our efforts in attempt to increase the quality of sanitation at that place.

2. Materials and Methods

The method applied in this research is a survey method which was conducted by analyzing and presenting the data systematically in order to simplify the understanding and concluding process [6]. The activity was initiated by performing observation in order to obtain facts on the field. The observation was done to all "pemindang" groups, processing groups, as well as the tools used in the process at the Central "Pemindangan" in Kusamba village. Aside from its main function in the research, the observation is also a fundamental activity at a community service which is beneficial to provide guidance and solution to the "pindang" processing technique in Kusamba village. Other than observation, an interview was also conducted on 5 respondents who were involved in the "pemindangan" process concerning hygiene and sanitation. The result of observation and interview was then presented descriptively.

3. Results and Discussion

3.1. The Profile of Central "Pemindangan" in Kusamba Village

The Central "pemindangan" process in Kusamba village houses 70 blocks of "pemindangan" which operate from 11 am to 5 pm depending on the number of fish productions and the space availability of ice storage. This "pindang" fish processing is a local business which has been run for years and is currently one of major household-based economy activities in Kusamba village. In the very beginning, the "pindang" process was conducted in the local people's houses, and the main ingredients were acquired only from the product of the local fishermen. This issue aroused a number of problems due to the business activities being confused with their personal matters in the same place, resulting in the dirty

environment, insufficient main ingredients, and poor product quality. In order to simplify the supervision and guidance to the “pemindangan” processing activities, the local government established Hall of “Pemindangan” in 1998 which aims at “pemindangan” activity organization from the local settlement to the specialized spots as the Central “Pemindangan”. In year 2007, Dawan District, Klungkung Regency was dubbed as the Central “Pemindangan” Process, in accordance with the verdict concerning the development location of Central Fish Processing Product Number KEP.01/MEN/2007, released by The Ministry of Marine and Fishery in 2007. According to the production data taken in June 2018, the fish production reached 522.200 kg which included tuna, mackerel, sardinella lemuru, barramundi, and silk fish, with mackerel being the most fish variant catches which goes by 468.200 kg.

3.2. The Process of “Pemindangan” in Kusamba Village

The process of “pemindangan” in Kusamba village is conducted by utilizing conventional tools. The fish selected to be the main ingredient for the “pindang” are usually fresh fish which have recently been caught or the ones which have been boiled and stored in the storage. Prior to being cleaned, the fish are usually placed on the floor, which are then washed in containers. Having been cleaned, the fish are then placed on bamboo baskets and greased with salt. The salt used to grease the fish is a regular product which appears brownish and is large in size. When the salting process is done, the fish are now placed in a large container containing boiling water over fire to initiate the boiling process. This boiling process is concluded when the eyes of the fish in the container emerge which is similar to a simple explosion. When the boiling process is done, the fish are now ready for sale, served on the previous bamboo baskets without any covers.

3.3. The Characteristics of “Pemindangan” in Kusamba Village

From all 70 workers who work at the Central “Pemindangan” Kusamba, most of them are 40-50-year-old women who only had primary school certification. Prior to giving intervention in the form of practical material presentation and guidance regarding how to acquire good quality of “pemindangan” process, 5 respondents were interviewed in order to obtain starting points in terms of their current condition. It was discovered that they lacked the knowledge, manner, and attitude related to hygiene and sanitation shown by the fact that they did not wear any safety outfits, hair covers, aprons, masks, safety foot wares, as well as the fact that they kept working despite currently suffering from influenza or typhus and smoking during working hours.

3.4. Hygiene and Sanitation of The “Pindang” Processing in Kusamba Village

The observations of hygiene and sanitation refer to the regulation of Sea Food HACCP (Hazard Analysis Critical Control Point), as follows:

a. Water Safety

Water which is going to be used is directed to flow through pipes and then collected in containers. No chlorine or alum is added.

b. Tools

Tools and containers used in the process are relatively clean. They are cleaned prior and after the process sometimes without using soap. There are no separate chambers which can house the tools and the “pemindangan” process in Kusamba village.

c. Cross-Contamination Prevention

The respective places for fish processing and storage are located separately. However, the workers ignore the aspects of hygiene as they do not wash their hands, nor do they change their clothes before and after working.

d. Hand washing facility, sanitation, and toilet.

Each block of “pemindangan” comes with one hand washing facility and 2-3 workers working around it. The condition of this hand washing facility is not good enough due to the fact that it is also used to clean the tools at the same time. Additionally, there is no soap for washing hands, and the only one toilet available near the supervisor office is not sanitary.

e. Ingredient-Contaminant Protection

The main building for the “pemindangan” process is roofless, making it vulnerable against any incoming contaminants. The drainage where the waste flows through also lacks any decent cover which can prevent it from contaminating the recycling process.

f. Proper labeling, storage, and toxic substance utilization

All toxic substances are properly stored inside unlabeled bottles in the supervisor office. EM 4 is one of them which can be used to recycle the waste coming from the “pemindangan” process.

g. Administering the health condition of personnel which can lead to contamination.

There is no attentive supervision towards the health condition of the workers in Kusamba village, which generally includes safety gloves, safety outfits, masks, and foot wares. The smoke generated by the “pemindangan” process has been reported to have caused respiratory problems, as well as musculoskeletal due to excessive workload.

h. Pest extermination in the processing unit.

There are no special actions for pest extermination which can possibly intrude the processing unit.

According to World Health Organization (WHO), hygiene and sanitation contribute significant impacts to the environment, in which they respectively maintain the health as well as prevent any disease outbreaks and improve the rate of health and security against any environmental factors which can spread diseases. Safely-consumed foods are those which appear without any signs of contaminations, microorganisms, bacteria, or any hazardous chemical substances; and have been processed properly so the nutrition is still intact and has no contradictions against humans' health [7-8]. The “pindang” product in Kusamba village which is mainly made from mackerels has long been preferably consumed by wide varieties of Balinese people. The making process of this fish-based food involves conventional tools in a small scale of business and budget, just like any other regions in Indonesia, which becomes the reason why hygiene and sanitation tend to be ignored in the process. The fact that the main ingredients and supporting items are varied depending upon environmental situations, shows that this conventional food processing has a drawback which is difficult to control. Traditional food processing products aim only to fulfill the needs of local markets as a consequence of the quality product not being able to meet the national standard (SNI) requirements [9-10].

The main fish as the ingredients used for the “pemindangan” generally come from scromboidae family [11]. This family of fish tends to be rotten quickly when saved in an improper place. Tuna, mackerel, mahi – mahi, sardine, anchovy, herring, bluefish, amberjack, and marlin are fish containing high concentration of histidine which will be converted into histamine as the bacteria develops [12]. This high concentration of histamine is responsible for the food poisoning cases when this food is consumed. This food poisoning case is initiated by several symptoms, in which patients will vomit, suffer from severe soreness on the throat, have swollen lips, seizure, nausea, reddish neck, rash, weakening body which are slightly similar to allergic reaction [12-13]. The microbes found within the fish body are *Vibrio parahaemolyticus*, *Vibrio cholerae*, *Salmonella*, and *E. coli* [14-15]. If these microbes contaminate the main ingredients, the final product may cause diarrhea, nausea, fever, headache, and extreme cold sensation when consumed. In another case, Bacteria *V. cholera* can cause severe cholera and diarrhea in which 60% of the patients have fallen due to dehydration [16]. Concerning the issues above, this “pemindangan” process is highly expected to be able to counter the bacteria and preserve the fish.

Hazard Analysis Critical Control Point (HACCP) is a control system which aims to prevent any issues based on the identification on critical points during production process. HACCP is a risk management developed to ensure the safety of foods through preventive approach which is considered capable of producing edible foods for consumers. The purpose of the actualization of HACCP in a certain food industry is to prevent any unexpected occurrences and to ensure that the demands of high quality food from the consumers are provided for. HACCP functions to control the quality of main ingredients until they come out in the form of final productions which are ready to be distributed to people [17-18]. In regards to what HACCP is capable of, it is highly expected that it can be a standard point for the central “pemindangan” food processing in order to improve its products, gain an National Standard of Indonesia (SNI label), and expand its market.

This article is a part of report in a community service activity conducted in Kusamba village. A number of interventions were given in the form of counseling and demonstration on how a proper

process of “pemindangan” was supposed to be executed. A lot of supporting yet essential tools like masks, safety gloves, and practical guide were also distributed during the activity in hope that good quality of “pindang” can be continuously produced in Kusamba village. The results of this observation are limited on certain points due to the fact that they only present the findings qualitatively without any laboratory analyses regarding the water quality and the product of “pindang” in Kusamba village.

4. Conclusions

Hygiene and sanitation are a necessity in food processing. Kusamba village is the largest center of pemindangan in Bali but in practice Kusamba Village has not paid attention to hygiene and sanitation in pindang processing. Community development in order to improve hygiene and sanitation there is needed to improve the quality of pindang products, so they are safe to be consumed by the community.

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