Udayana University

NDSU NORTH DAKOTA STATE UNIVERSITY

PROCEEDING

The International Conference on Biosciences 2016

"Advancing Biodiversity for Sustainable Food Security"

July 26 - 27, 2016

3rd Floor Postgraduate building , Udayana University,
Jl. PB Sudirman, Denpasar-Bali, Indonesia

held by

Faculty of Mathematics and Natural Sciences Udayana University, Bali
Postgraduate Study Program of Biology Udayana University, Bali
North Dakota State University, USA
School of Biology, Udayana University, Bali

PROCEEDING

THE INTERNATIONAL CONFERENCE ON BIOSCIENCES
"Advancing Biodiversity for Sustainable Food Security"

Udayana University, Bali, 27th - 28nd July 2016

Held by:

Postgraduate Study on Biology, Faculty of Mathematics and Natural Sciences, Udayana University, Bali, Indonesia

and

The North Dakota State University, United States of America

Editors:

Prof. Kalidas Shetty, Ph.D.
Drs. Yan Ramona, M.App.Sc., Ph.D.
Dr. Iriani Setyawati, S.Si., M.Si.
Ir. Ida Ayu Astarini, M.Sc, Ph.D.

Reviewers:

Dr. Pande Gde Sasmita J., S.Si., M.Si.
Dra. Ni Luh Watiniasih, M.Sc, Ph.D.
Dra. Inna Narayani, M.Sc.
Dr. Dra. Retno Kawuri, M.Phil.
Dr. Anak Agung Ketut Darmadi, M.Si.
Ni Luh Arpiwi, S.Si., M.Sc, Ph.D.

Published by: Udayana University Press
ISBN 9-786022-941491

PREFACE - CHAIRMAN OF THE ORGANIZING COMMITTEE

This proceeding compiles all papers presented in the International Conference on Biosciences 2016 held at the Udayana University, Bali on 27th - 28nd July 2016, which was aimed to gather scientists, government officers, and industries in Biosciences-related disciplines, so that they could discuss and share their expertise, experience and expand networking.

This International conference was an implementation of MoU between the Postgraduate Study on Biology and The North Dakota State University and held in accordance to the 54th Anniversary of Udayana University. The conference consisted of 5 plenary sessions in which all honorable invited speakers delivered their works covering general aspects of Biosciences related topics. They came from Australia, India, Indonesia, Japan, Malaysia, and USA. Besides these plenary sessions, we also had four satellite symposia, covering areas of: (1) Ecology and environmental biology, (2) Physiology and developmental biology, (3) Biotechnology, genetics, molecular biology, (4) Health and microbiology, and (5) Food and agriculture. Totally more than 100 contribution papers (oral and poster presentation) were presented in this conference. The efforts of the presenters to prepare their contribution papers for this conference are highly appreciated.

This Conference was financially supported by the Rector of Udayana University, Faculty of Mathematics and Science, Udayana University, Postgraduate Study on Biology, Udayana University, and NDSU through GIFSA Institute founded by Prof. Kalidas Shetty. Therefore, in this occasion, on behalf of the committee, I would like to thank their generous supports on this conference.

My special thanks should also go to all people who have been involved in the committee of the conference. Without their hard working and efforts, I am afraid we would not be able to make this event to happen.

We hope that all papers presented in this proceeding will prove useful for further studies in Biosciences-related areas.

Once again, thank you very much for your participation in this conference, and see you again in 2018.

Chairman of the Organizing Committee

Drs. Yan Ramona, M. App.Sc., Ph.D.

TABLE OF CONTENTS

MICROBIAL CONTAMINATION IN TRADITIONAL FOOD PROCESSING *PEDETAN*

Ni Made Ayu Suardani Singapurwa*, A.A. Made Semariyani, and I Putu Candra

Department of Food Science and Technology, Warmadewa University
Terompong 24th Road, Tanjung Bungkak Denpasar 80235, Bali
*Corresponding author: a.suardani@gmail.com

Abstract

This study aims to determine the microbial contamination in the processing of the traditional food sardine fish (*Sardinella longiceps*) *pedetan* in Jembrana Bali. The sampling was conducted on the three groups of the producer of *pedetan*. The analysis of the *Total Plate Count* and the *Escherichia coli were* carried out by the swab at the washing place, the process of seasoning and drying and the sampling of water used for manufacturing the products. The analysis of the *Salmonella*, the *Vibrio cholerae* and the *Staphylococcus aureus* were performed on the fresh fish and the dried fish. The laboratory analysis showed that the average *Total Plate Count* was 1.56 x 10^7 (cfu/ml), *Escherichia coli* was 0 (cfu/ml), *Salmonella* was negative (per 25 g), *Vibrio cholerae* was negative (per 25 g), *Staphylococcus aureus* was negative (colony/g). The results showed that the sanitation and hygiene in the processing of traditional food *pedetan* are good enough and for the microbial contamination in the dried fish products is in good agreement with the requirements of the SNI 2721:1: 2009, except for the TPC that was not in accordance with the SNI requirements which is 1.0 x 10^5 (cfu/ml)

Keywords: Microbial Contamination, Traditional Food, Pedetan.

BACKGROUND

A traditional fish processing have a better prospects and development opportunities. A traditional fish processing is very complex and much more based on an inherited conception. One of the traditional processed fish products is Sardine *Pedetan*. *Pedetan* is a food product similar to a traditional Balinese marinated dried fish processed by the people in the area of Jembrana, Bali province. *Pedetan* is made of Sardine fish (*Sardinella longiceps*) found in the coastal areas of Jembrana.

In the processing stage of traditional fish, the type and the quality of the raw materials and also the other ingredients are vary greatly, environmental conditions are difficult to be controlled, as well as the end point of a process that is uncertain. The technology for fishery traditional products is characterized by an image that is not good, where the traditional products are processed at low level of sanitation and hygiene, using raw materials with low level of quality or freshness, the food safety that is not assured, the technology that has been used for generations, and the company that is managed by families with inadequate levels of management capability (Singapurwa *et al*., 2014)

This contamination may play a significant role in the transmission of potentially harmful microorganisms which causes different diseases such as cholera, diarrhea and skin infections. It is therefore expedient that great care is taken during handling and the preparation of our fish products to avoid or reduce the level of microbial load and contamination. Thorough cooking processes and good hygiene practices could help reduce the microbial load to harmless level (Agyei and Maalekuu, 2014).

The reliable supply of safe food that is free from harmful contaminants is important for the people's general health and daily life, economic development and social stability and the government and countries image. One way to protect a population from all the detrimental impacts of food microbiological contamination is to spread information and knowledge about the sources and routes of transmission of pathogens into food (Ulum *et al*., 2016). Therefore determine the microbial contamination in the processing of the traditional food sardine fish *pedetan***.**

MATERIALS AND METHODS

The study was conducted in Jembrana Regency, Bali Province on January 2016 to June 2016. The samples were taken in three villages of coastal areas that used to make *pedetan* who sell to traditional markets. Microbiological analysis will be conducted at the Food Analysis Laboratory of the Faculty of Agricultural Technology Universitas Udayana and Laboratory Fish Inspection and Quality Control Provincial Marine and Fisheries Affairs of Bali.

Laboratory analysis is based on determination of Total Plate Count by SNI 01-2332.3-2006, Determination of *Escherichia coli* by SNI 01-2332.1-2006, determination of *Salmonella* by SNI -01-2332.2-2006, determination *Vibrio cholerae* by SNI 011-2332.4- 2006 and determination of *Staphylococcus aureus* by SNI 2332.9-2011.

RESULTS

The Research result was average of Total Plate Count in each processing traditional food sardinella fish *pedetan* collected with swab at the washing place was 1.07 10^6 cfu/ml, the process of seasoning was 3.90 x 10^7 cfu/ml, drying was 6.67 x10^1 cfu/ml, and the sampling of water used for manufacturing the products was 3.33 x 10^1 cfu/ml. Average of *Total Plate Count* in processing *pedetan* was 1.56 x 10^7 cfu/ml (Table 1). Microbial contamination in processing pedetan with swab at the washing place, the process of seasoning, drying, and the sampling of water used for manufacturing the products were 0 cfu/ml (Table 2).

Table 1. *Total Plate Count* (cfu/ml) in processing pedetan

Processing	Producer 1st	Producer 2nd	Producer 3th	Average
The washing place	0	2.0 x10^3	3.2 x10^6	1.07 x 10^6
The process of seasoning	1.17 x 10^8	0	6.6 x 10^7	3.90 x 10^7
The drying place	1.0 x 10^2	0	1.0 x10^2	6.67 x 10^1
The sampling of water	0	1.0 x 10^2	0	3.33 x 10^1
Average				1.56xx 10^7

Table 2. *Escherichia coli* (cfu/ml) in processing pedetan

Processing	Producer 1st	Producer 2nd	Producer 3th
The washing place	0	0	0
The process of seasoning	0	0	0
The drying place	0	0	0
The sampling of water	0	0	0

Microbial contamination in processing *pedetan* for before process in wet fish and after processed in dry fish for *Vibrio cholera* was negative (per 25 g), *Salmonella* sp. was negative (per 25 g), *Staphylococcus aureus* was negative (colony/g) (Table 3).

Table 3. Microbial contamination in processing pedetan

Microbial contamination	Wet fish (before processed)	Dry fish (after processed)
Vibrio cholera (per 25 g)		
Producer 1st	Negative	Negative
Producer 2nd	Negative	Negative
Producer 3th	Negative	Negative
Salmonella sp.(per 25 g)		
Producer 1st	Negative	Negative
Producer 2nd	Negative	Negative
Producer 3th	Negative	Negative
Staphylococcus aureus (colony/g)		
Producer 1st	Negative	Negative
Producer 2nd	Negative	Negative
Producer 3th	Negative	Negative

DISCUSSIONS

Some microbes play important roles in the food industry because they confer important properties to the edible products. However, other ones reduce food quality mainly by contamination with toxins harmful for human health and generate great economic losses per year (Vaquero *et al.,* 2015). The Research resulted by Agyei and Maalekuu (2014) was presence of indicator organism including *E. coli* and *Salmonella* that the presence of these organisms in food makes food unhealthy for consumption. The exposure of fish products to unhygienic practices from the point of production to retail level increases the level of microbial contamination in the produce. Microbial contamination in processing *pedetan* in this research for *Vibrio cholera, Salmonella* sp., and *Staphylococcus aureus* were negative. The microbes and pathogens were totally absent in solar dryer dried samples. The samples dried using solar dryer have comparatively good nutritional value and hygienic status followed by fish rack dried sardine. Solar drying and its improved processes minimize or stop some of the limitations of open sun drying. Drying in solar dryer is different from open sun drying because the solar dryer is an enclosed structure that traps heat inside the drier and make effective use of the heat (Immaculate *et al*., 2012).

E. coli, which was rarely found on the inside surfaces, originated mainly from such highly contaminated surface sites. The fact that the inside surfaces remained

damp after sanitation, we could rule out the selective loss of viability of *E. coli* cells due to drying. The main purpose of hygiene in the food production is to ensure the safety of the food Products. It is known that heat treatment, which eliminates the other species of micro flora (Schlegelová *et al.,* 2010). Thirty six (30%) samples were positive to *Escherichia coli* and no *Salmonella* was detected in any samples of food. It was concluded that health conditions of production for product is low and it needs to promote the hygiene and safety in the production line of product (Asidi *et al*., 2015). Illness-causing bacteria may survive on various surfaces around the kitchen, including hands, utensils and cutting boards. For utensils and cutting boards to be sufficiently sanitized, hot water with detergent and a sanitizing (bleach) solution should be used (Nhlapo *et al*., 2014).

The results have studied by Dib *et al*., (2014) constitute an indicator of bacteriological contamination and showed that samples markets were contaminated with potential pathogenic microorganisms. No strain of *Staphylococcus aureus* and *Vibrio* were detected. The observation points to the absence of a practice that isolates these surfaces from one another so as to prevent or hinder cross-contamination. Other factors which may lead to the contamination of surfaces include the use of contaminated water and shortcomings in surface sanitation methods, such as an incorrect detergent to water dilution ratio or an inadequate contact time (Nhlapo *et al.*, 2014).

Surface contamination decreased, corrective measures still must be enforced and the employees must be oriented regarding the importance of hygiene. It is crucial that all food production be organized and that the hygiene procedures, often left to second thought, be carried out effectively and uninterruptedly. The repetitive nature of the tasks and the lack of incentive favor a gradual reduction in quality, which increase the risk of pathogenic microorganism contamination. Therefore, it is important that those responsible for food producers acknowledge the value of this activity to obtain quality products from the hygienic sanitary standpoint (Sousa *et al*., 2014). The surfaces may not have been sources of contamination, opportunity for cross contamination among surfaces may exist because of a lack of surface isolation and shortcomings in cleaning regimes. To prevent cross-contamination, all equipment and working surfaces must be thoroughly washed with hot water and detergent after being used to prepare raw foods. In this regard, sanitation program have proved to be cost effective and simple to implement and to significantly reduce microbial contamination (Nhlapo *et al.*, 2014). Therefore, it is recommended to establish a local investment and safeguard mechanism to develop local microbiological surveillance, especially for local characteristic foods (Pei *et al*., 2015). Surveillance of potential contaminant bacteria in harvested seafood is crucial for sustenance of public health (Dib *et al*., 2014).

The total plate count for the sampling of water in this research used for manufacturing the products average was 3.33×10^1 cfu/ml because two producers used water supply with chlorine and one of them used water supply not available chlorine. The microorganism concentration was 10^3-10^6 cfu/ml, and the concentration of available chlorine was 0 mg/l. At the concentration of available chlorine was 0.4 mg/l and there was no bacterial contamination at that point (Yorioka *et al*., 2016). The Higher microbial counts in some samples may be attributable to handling during harvest or processing. The total bacteria count on fish rarely indicate the quality of the fish but it gives an indication of the risk of spoilage

induced since each of these organisms had different ways of effecting health conditions of consumers of such contamination fish. The seafood products from markets are generally unsafe for the consumers, the presence of contaminating bacteria could be attributed to cross contamination from environment, source and handling by the sellers. Safety of this kind of seafood can be guaranteed mainly by preventive measures and application of appropriates procedures of hygiene (Dib *et al*., 2014).

The food safety depends on understanding the need to prevent food contamination (through the mirror of food contamination/pathogen impacts) as well as the food contamination pathways or mechanisms, well enough to prevent them. The exclusion and control of the well estimated risk factors through the above named practices can help to develop safe food all over the world and reduce the socioeconomic burden of foodborne diseases. Surprisingly, recent records show that microbiological contamination and pathogen contaminated foods still represent important causes of unintentional injury, diseases and death. Besides diseases and death, the consumption of pathogen-contaminated foods has also created economic, social and psychological impacts that were quiet devastating on the consumers, nations and food dealers and companies (Ulum *et al*., 2016).

CONCLUSIONS

The results showed that microbial contamination in traditional food *pedetan* based on requirements for quality and food safety salty dry fish SNI 2721: 1: 2009, the value of Total Plate Count with an average of 1.56 x 10^7 cfu / ml exceeds the limit required, which is 1.0 x 10^5 (cfu / ml). While the value of microbial contamination of *E. coli*, *Salmonella*, *V. cholerae*, and *Staphylococcus aureus* as required.

ACKNOWLEDGEMENT

Much obliged for DP2M DIKTI which have funded Decentralization Research Competitive Grant in 2016. Thanks also goes to all those who have helped this research.

REFERENCES

Agyei, P.A. and B.K. Maalekuu. 2014. Determination of microbial contamination in meat and fish products sold in the Kumasi metropolis (A Case Study of Kumasi central market and the Bantama market). *Merit Research Journal of Agricultural Science and Soil Sciences*. 2(3): 038-046.

Alum, E. Akanele, Urom, S. M. O. Chukwu, Ben, C. M. Ahudie. 2016. Microbiological Contamination of Food: The Mechanisms, Impacts And Prevention. *International journal of scientific & technology research.* 5(3):65-78.

Dib, A.D., N. Lakhdara, E. E. Rodriguez, R. Kabouia, E. M. Roldán, M. E. García, H. Koutchoukali, L. Guerraichi, O. Bouaziz. 2014. Prevalence of microbial contamination of fresh seafood product sold in Constantine, Algeria. *Environmental Skeptics and Critics*. 3(4): 83-87.

Immaculate, J., P. Sinduja, P. Jamila. 2012. Biochemical and microbial qualities of *Sardinella fimbriata* sun dried in different method. *International Food Research Journal*. 19(4): 1699-1703.

National Standardization Agency (BSN), 2006. SNI 01.2332.3.2006. Microbiology Test Method-Part 3: Determination of Total Plate Count (TPC) in Fishery Products.

National Standardization Agency (BSN), 2006. SNI 01.2332.4.2006. Microbiology Test Method-Part 4: Determination *Vibrio cholera* in Fishery Products.

National Standardization Agency (BSN). 2009. SNI 2721.1: 2009, Salted Fish-Part 1: Specification.

National Standardization Agency (BSN), 2011. SNI 01.2332.2.2006. Microbiology Test Method-Part 2: Determination of *Salmonella* in Fishery Products.

National Standardization Agency (BSN), 2011. SNI 01.2332.9.2011. Microbiology Test Method-Part 9: Determination of *Staphylococcus aureus* in Fishery Products.

Nhlapo, N., R. J.F. Lues. W. H. Groenewald. 2014. Microbial counts of food contact surfaces at schools depending on a feeding scheme. *South African Journal of Science*. 110 (11/12):1-5.

Pei, X., N. Li, Y. Guo, X. Liu, L. Yan, Y. Li, S. Yang, J. Hu, J. Zhu and D. Yang. 2015. Microbiological Food Safety Surveillance in China. *Int. J. Environ. Res. Public Health.* 12: 10662-10670.

Schlegelová1, J., V. Babák, M. Holasová, L. K. Tantinová, L. Necidová, F. Šišák , H.Vlková, P. Roubal and Z. Jaglic. 2010. Microbial Contamination after Sanitation of Food Contact Surfaces in Dairy and Meat Processing Plants. *Czech J. Food Sci.* 28(5): 450-461.

Singapurwa, N.M.A.S., N. M. Darmadi, A.A.M. Semariyani. 2014. Characteristics of Traditional Food *Pedetan* in Jembrana Regency. *International Journal of Advanced Science Engineering Information Technology.* 4(2):68-74.

Sonia Asadi, S., Z. Re. Maram, F.Kooshk. 2015. Evaluation of microbial contamination of pastry cream in Arak city of Iran. *Journal of Food Safety and Hygiene.* 1(1): 26-29.

Sousa, C.L., J.A. Freitas, L.F.H. Lourenço, E. A. F. Araujo, M. R. S. P. Joele. 2014. Microbiological contamination of surfaces in fish industry. *African Journal of Microbiology* Research. 8(5):425-431.

Yorioka, K., S. Oie, K. Hayashi, H. Kimoto, H. Furukawa. 2016. Microbial Contamination of Ice Machines Is Mediated by Activated Charcoal Filtration Systems in a City Hospital. *Advancement of the Science*. 78(10):32-35.

Vaquero, M.J.R., C. V. Vallejo, F. M. Saguir and D. A. Sampiet. 2015. Preservative and Antitoxigenic Activities of Phenolic Compounds: Usefulness in Prevention of Microbial Spoilage and Toxin Contamination of Food Products. *Chemical Physics Research Journal*. 7(2):148-166.

COPPER HAIR LEVEL ON CHILDREN WITH HIV/AIDS

Niruri R[1*], Wati K.D.K[2], Oktavianti K.A.D[1], and Cahyani M.R[1]

[1]Department of Pharmacy, Faculty of Mathematic and Science,
Udayana University, Bali, Indonesia
[2]Pediatric Department, Sanglah Hospital, Bali, Indonesia
* Corresponding author: rasmaya@yahoo.com

Abstract

Copper, a component of antioxidant enzymes, has a role in immune system against HIV. This study aimed to identify Copper (Cu) hair level on children (0-12 years old) with HIV/AIDS. The data was collected from medical record on the period of December 2014 – May 2015. Value of Cu normal hair level is 9,29 - 13,89 µg/g. Data of forty patients were collected, which hair concentration of Cu on 34 subjects were excess, and on two children were lower than the normal value. Therefore, further clinical evaluation need to be conducted.

Keywords: Copper Hair Level, HIV/AIDS, Children

BACKGROUND

Bali was reported as the fourth province with the highest incidence of HIV / AIDS in Indonesia (Kemenkes, 2014). In the period of January 2007 to November 2011, 103 children were diagnosed with HIV positive in Sanglah Hospital, Denpasar, Bali. (Saputri, 2013). Oxygen free-radicals, which are resulted during oxidative stress, could give a protection against viral attack, but during the protection process it causes tissue destruction by inducing inflammation. Depletion of antioxidant, such as glutathione, may be occurred in the viral infection. A balance between oxidant and antioxidant for viral activation and deactivation, is needed. Therefore, having harmful pro-oxidant and antioxidant component equally are important. Antioxidant deficiency may cause to T cell apoptosis and stimulate HIV-replication. Micronutrients, such as copper (Cu), Zinc (Zn), Selenium (Se), Manganese (Mn) , are cofactors of antioxidants enzymes to give body protection from oxygen free radicals. Cu can initiate reaction of the free radicals and also plays the role as a cofactor of a free- radicals scavenging enzyme Cu/Zn- superoxide dismutase (Chaturvedi, 2004; Duggal,2012,).

Cu is found in food (such as in beans, clams, seeds, and liver), water, and the atmosphere (Trojawnoski, , 2009; WHO, 2004) . Most Cu dietary are excreted through liver. Intracellular Cu should be tightly managed. If Cu accumulate in liver, it leads to the organ damage (Robert, 2008). Highest concentrations in normal condition of Cu are found in hair, nail, brain, liver, kidney, and heart (WHO, 2004). Cu hair sample is preferred because it is easy to get and to store, and not an invasive method (Trojawnoski, 2009). This study aimed to identify Copper (Cu) hair level on children (0-12 years old) with HIV/AIDS in Sanglah Hospital, Denpasar, Bali, Indonesia. Therefore, it can provide the data of Cu status, which will be used to