INTERNATIONAL CONFERENCE ON FOOD SCIENCE AND TECHNOLOGY

THE CHALLENGE OF UNIVERSAL FOOD QUALITY AND SAFETY REGIME

THEATRE ROOM,
3RD FLOOR OF
THOMAS AQUINAS BUILDING,
SOEGIJAPRANATA
CATHOLIC UNIVERSITY,
SEMARANG, INDONESIA

ON:
THURSDAY AND FRIDAY,
31 JULY AND 1 AUGUST 2008

PROCEEDING BOOK

ISBN : 978-979-1268-36-3

UNIKA
UNIVERSITAS KATOLIK
SOEGIJAPRANATA

Jl. Pawiyatan Luhur IV/1 Bendan Duwur Semarang 50234
Telp. 024-8441555 (hunting) Fax. 024-8445265, 8415429
e-mail : unika@unika.ac.id http : //www.unika.ac.id

PREFACE

Food quality and safety is nowadays not just the main concern in every stage of food chain, but is likely a new stage in food culture. Food scientist, food technologists, food industry, as well as business communities and the governmental bodies are challenged not just to care of, but to guard the new era of man-kind culture on food. For this the faculty of Agricultural Technology, Soegijapranata Catholic University invites food communities all over the world to share their ideas, research findings as well as opinions in the International Conference on Food Science and Technology, to welcome "The Challenge of Universal Food Quality and Safety Regime".

The conference successfully gathering about 100 papers, presented by more than 7 countries in two days. This proceeding brings together these papers, organized in two presentation schemes :

A. Oral, covering of 6 topics :
   1. Food Supply Chain Deversity
   2. Food Processing and Engineering
   3. Food Microbiology and Biotechnology
   4. Food Marketing and Quality Management
   5. Nutritional and Functional Food
   6. Food Safety and Quality
B. Poster, followed by 34 papers

In order to response the newest trend on food quality and safety regime, the conference also organized 6 plenary presentation focusing on "The Challenge of Universal Food Quality and Safety Regime". The organizing committee is grateful to all honorable speakers, participants and sponsors, for joining this gathering and for their valuable contribution on the conference.

Semarang, August 2008

PLENARY SESSION

TITLE / AUTHOR	CODE
Seeking for a Balance Between Food Industry and Consumer Protection : Indonesia Experience in Meeting Food Quality and Safety Standard ***Prof. Dr. Ir. H. Dedi Fardiaz, M.Sc.*** ***Deputy Director for Foof Safety and Hazardous Substance Control National Agency for Drug and Food Control Republic of Indonesia***	PS – 01
Food Packaging Waste in Indonesia: Is Extended Producer Responsibility (EPR) Feasible? ***Prof. Dr. Ir. Budi Widianarko, MSc.*** ***Department of Food Technology, Soegijapranata Catholic University (UNIKA)***	PS – 02
Genetically Modified Crops and Their Risk Assessment ***Prof. Nico van Straalen*** ***Vrije Universiteit Amsterdam***	PS – 03
Ed Alejandrino ***VP Flavor Regional Sales Asia Pasific / President Director PT Firmenich Indonesia***	PS – 04
Food for Medicine : Exploration Beyond Quality and Safety ***Prof. Dr. Muhamad Bin Zakaria*** ***Division of Biohealth Sciences, Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia***	PS – 05
Indonesian Traditional Nutraceuticals : Perspective from the "Jamu" Producer ***Representative of PT Mustika Ratu*** ***PT Mustika Ratu / Gabungan Pengusaha Jamu Indonesia***	PS - 06

NUTRITION AND FUNCTIONAL FOOD

TITLE / AUTHOR	CODE
Activity of DPPH (1,1-Diphenyl-2-Picrylhidrazyl) Free Radical Scavenger by Some Indonesia Tea Bags *Nana S. Achyadi, Dadan Rohdiana*	NFF - 02
Antioxidant Activity of Anthocyanin of Black Soybean Seed Coat in Human Low-Density Lipoprotein (LDL) *Ignasius Radix Astadi, Mary Astuti, Umar Santoso*	NFF - 03
Application of Computational Chemistry Method to Study the Relative Antioxidant Efficiency of a Large Series of Carotenoids *Zaky Al-Fatony, Hanggara Sudrajat, Bongkot Pipoosananakaton, Sudarath Veravong, Nathaya Selphusit*	NFF - 05
The Using of Red Betel as a Natural Antioxidant *Rifda Naufalin, Erminawati*	NFF - 06
Diet Food Formula for Children Suffering Severe Malnutrition during Stabilization Phase *Astuti Lamid*	NFF - 07
Red Palm Oil, an Effort for Saving Functional Properties of Palm Oil (a Review) *F. Ayustaningwarno*	NFF - 08
The Nutritional Composition of Garcinia atroviridis Leaves and its Antioxidant Availability throughout Extraction and Drying Process *Nursakinah I., Zulkhairi A., Hasnah B., Kamilah KAK., Fazali FMN., Khairunnuur A., Kamal NHM., Taufik HBM., Aris MM., Zamree MS., Shahidan MA.*	NFF - 09
Nutritional Composition, in Vitro Antioxidant Activity and Artemia salina L. Lethality of Pulp and Seed of Tamarindus indica L. Extracts *Khairunnuur F.A., Zulkhairi A., Hasnah B., Khairul Kamilah A.K., Fazali F., M. Kamal N.H., Sakinah I.*	NFF - 10
Effectiveness of Bio-Iodine and Need for Nutrigenomic Approach *Komari, Astuti Lamid, Adini Alvina*	NFF - 11

FOOD MICROBIOLOGY AND BIOTECHNOLOGY

TITLE / AUTHOR	CODE
The Survival of Probiotic L.acidophilus as a Starter In Fermented Goat's Milk During Refrigerated Storage *Antonia Nani Calyanti, Anang Mohammad Legowo, Nurwantoro*	FMB - 01
Proteolytic Activity Profiles of Bacillus Sp. Strains S2-3 and S4-5 Isolated from Terasi *Novi Arfarita, Sarote Nitsawang, Shannaphimon Wongkam, Jutamart Monkai, Anchalee Khuanpet, Ekachai Chukeatirote*	FMB - 02
Assessment of Bacterial Populations in Discoloration Spoilage of Nata De Coco Using Amplified Ribosomal DNA Restriction Analysis (Ardra) *Tan W.A., Yogiara, Suwanto A.*	FMB - 06
Preliminary Studies for Producing Lipase from Tempe's Mould for Digestion Supplement *Teuku Beuno Bardant, Kiky Corneliasari Sembiring, Achmad Hanafi Setiawan, Fauzan Aulia*	FMB - 07
Application of Computational Chemistry Method to Study The Antioxidant Activity of Curcumin *Syahrul Khairi, Hanggara Sudrajat, Pranyong Dongdee, Nathaya Selphusit Mongkol Sukwattanasinitt*	FMB - 08
The Occurrence of Mycotoxigenic Moulds in Cocoa Beans from Indonesia and Queensland, Australia *Anton Rahmadi, Graham H. Fleet*	FMB - 10

FOOD SAFETY AND QUALITY

TITLE / AUTHOR	CODE
Stability of KIO_3 in Salt with Naedta Stabilizer ***Siti Helmyati, Narendra Yoga Hendarta, Surmita***	FSQ - 01
Enhancing Quality of Chicken Broiler Meat by Inducing Short Chain Hydrobenzene of Curcuma Sp. ***Lasmono Tri Sunaryanto, Sumardi***	FSQ - 02
The Quality Characteristics of Malaysian Commercial Chicken Nuggets ***Ismed Lukman, Nurul Huda, Noryati Ismail***	FSQ - 05
Natural Food Colourant from Seed of Kesumba (Bixa Orellana L.) ***Suparmi, Budhi Prasetyo, Leenawaty Limantara***	FSQ - 06

FOOD PROCESSING AND ENGINEERING

TITLE / AUTHOR	CODE
Optimization of Gews Sago Starch Prepared by Alcoholic-Alkaline Treatment ***Jau-Shya Lee, Kuan Yau Hoong***	FPE - 04
Effect of Combination Egg White Powder With Tapioca and Sago Flour on The Quality of Duck Sausages ***Muthia Dewi, Nurul Huda, Noryati Ismail***	FPE - 06
Effect of Precooling Treatment and Storage Temperatures on Physical Quality of Mangosteen (Garcinia Mangostana L.) ***Qanytah, I Wayan Budiastra, Roedhy Poerwanto***	FPE - 07
Utilization of Monoacyl Glycerol for Producing Margarine Based on Virgin Coconut Oil ***Kiky Corneliasari Sembiring, Teuku Beuna Bardant, Achmad Hanafi Setiawan, Hadidjah***	FPE - 08
Improvement of Bread Quality Made from Frozen Dough using DATEM (diacetyl tartaric acid esters of monoglycerides) and HPMC (Hidroxypropylmethylcellulose) ***Tania Susanti, Ir. Pertus Sri Naryanto, Mp.***	FPE - 09
The Partial Characters of Chemically Modified Banana Hump Starch ***Rudito, Anis Syauqi, Ernita Obeth, Yuli Witono***	FPE - 10
The Effect of Calcium and / or Whey Proteins Supplementation on Textural Properties of Low-Fat Yoghurt ***Umi Purwandari, Todor Vasiljevic***	FPE - 12
Physico-Chemical Properties and Fatty Acids Profile of Skipjack (Katsuwonus Pelamis) Fish Oil ***Christine F. Mamuaja, Hari Purnomo, Yunianta***	FPE - 14
The Effect of Hydrocolloids on Dough Rheology and Physical Properties in Gluten Free Bread Using Cassava Flour (Manihot Esculenta Crantz) ***Angelina Rosita Puspaningtyas, Kristina Ananingsih, Ita Sulistyawati***	FPE - 15

Evaluation of Physicochemical Properties and Microbiological Level of Pink Guava Juice (Psidium Guajava L.) During Pasteurization Process *Veronica Ima P, Amelia Jovita, R. Probo Yulianto, Kristina Ananingsih*	FPE - 16

FOOD MARKETING AND QUALITY MANAGEMENT

TITLE / AUTHOR	CODE
Outlook for Dried Tropical Fruit Production in Indonesia and Its Need of Quality Management ***Fifi Sutanto-Darmadi***	FMQM - 01
An Investigation of Microbiological Quality of Tiger Prawn, Cockle and Squid from Traditional Market and Supermarket in Surabaya ***Ignatius Srianta, Netty Kusumawati, Aysan Husein Juniawati***	FMQM - 02
Contamination of Salmonella, Shigella and Stapylococcus Aureus in The Street Food Sold in Elementary School, Jetis, Bantul, Daerah Istimewa Yogyakarta (DIY) ***Fatma Zulrotun Nisa***	FMQM - 03
Determination of Coloring Agents Added into Pathilo Distributed at Traditional Market at Gunungkidul Yogyakarta ***Crescentiana D. Pocloengasih, Hernawan, Yuniar Khasanah, Ratnayani***	FMQM - 04
Children Sensories Acceptance to Rice Cake Enriched with Defatted Rice Bran ***Anita Maya Sutedja and Ch. Yayuk Trisnawati***	FMQM - 05
Efficient Strategies and Results of Applying ISO 9001, Oshas, ISO 14001 and ISO 22000 at a Drinking Water Treatment Plant and Distribution Through Pipes ***Audrey Caron Rumamby***	FMQM - 06
Factory Layout of Guava Puree in Kaliwungu, District of Banjarnegara ***Indrie Ambarsari, Sarjana, Abdul Choliq and Syamsul Bahri***	FMQM - 07

FOOD SUPPLY CHAIN DIVERSITY

TITLE / AUTHOR	CODE
Fatty Acid Composition and Cholesterol Content of Male Etawah Filial and Castrated Boer X Indegenous Goat Meat ***Djalal Rosyidi, Hari Purnomo, Ina Musta Ina, Rulan Priesta Prastiti***	FSCD - 02
An Analysis of Mass Transfer Inside Mango During Osmotic Dehydration ***Aditya Putranto, Maximilian Simon, Hendri Lesmana***	FSCD - 03
The Use of Bromelain in The Chitin Production of Shrimp's (Penaeus Monodon) Shell Wastes ***Yunianta***	FSCD - 05
The Assesment of Limau Orange Drink Processing in The Weragati Village, Palasah, Majalengka ***Heny Herawati, Dian Histifarina, Mulyani, Yayan Rismayanti***	FSCD - 06

POSTER

TITLE/AUTHOR	CODE
Aspergillus flavus Growth was Essential in Gathotan Fermentation, but Aflatoxin was not Produced ***Umi Purwandari, Hani S. El-Nezami, Ann C. Lawrie***	P - 02
The Influence of Improperly used Frying Oil on Lipid Metabolism in Rats ***Ambar Rukmini***	P - 03
Addition of Docosa Hexaenoic Acid and Arachidonic Acid into Food Formula to Improve the Intellectual Development of Severe Malnourished Children ***Astuti Lamid, Koniari***	P - 05
Potential of *Ipomoea batatas* L. Ethanol Extract in Lowering Blood Glucose Level in Diabetic Mice ***Evhy A., Khotib J., Taufik Hidayat M., Zulkhairi A., Mokhlas MAM., Andang M.***	P - 07
Theobroma cacao Extract Blocks Stress Induced Hypotension in Rats ***Farah Idzyu N., Taufik Hidayat M., Zulkhairi A., Hasnah B., Sharida F., Che Norma M.T., Moklas M.A.M., Khairul Kamilah A.K., Evhy A.***	P - 08
Nutritional Composition and Toxicity Study of *Anacardium occidentale* Linn. using Brine Shrimp Lethality Test ***Fazali F., Zulkhairi A., Hasnah B., Khairul-Kamilah AK., Khairunnuur FA., Nursakinah I., Kamal NH., Zamree MS., Shahidan MA.***	P - 09
Effect of Different Smoking Process on Smoked Sarden Quality ***Fronthea Swastawati, Eko Susanto, Sutanto***	P - 10
The Influence of RMU (Rice Milling Unit) Parameter to the Rice Quality ***Heny Herawati, Iskandar Ishaq***	P - 12
Various Chicken Extract on Brine Fermentation to Produce Salt Soy Sauce by using Inoculum of *Aspergillus oryzae* ***Yetti Mulyati Iskandar, Agustine Susilowati, Aspiyanto***	P - 14
Germinated Brown Rice as a Potential Hypocholesterolemic Agent ***Khairul Kamilah A.K., Zulkhairi A., Azrina A., Norhaizan M.E., Maznah I., Hasnah B., Sakinah I., Taufik Hidayat M., Mokhlas M.A.M., Khairunnuur F.A., Fazali F.***	P - 15

AN INVESTIGATION OF MICROBIOLOGICAL QUALITY OF TIGER PRAWN, COCKLE, AND SQUID FROM TRADITIONAL MARKET AND SUPERMARKET IN SURABAYA

Ignatius Srianta[1)2)], Netty Kusumawati[2)] and Aysan Husein Juniawati[2)]

[1)] Center for Food and Nutrition Research, Research Institute and Community Services
[2)] Food Technology Department, Faculty of Agricultural Technology, Widya Mandala Surabaya Catholic University, Dinoyo 42-44 Road, Surabaya 60265
Email: srianta_wm@yahoo.com

ABSTRACT

Prawn, cockle, and squid are marine products which contain high protein and moisture. Therefore, these commodities have high risk of growth of spoilage and pathogenic bacteria. Salmonella is a pathogenic bacteria which was frequently found in seafood. According to the Indonesian National Standard, microbiological quality of fresh seafood are total bacteria of 10^7 cfu/g and negative for Salmonella. The objective of this research is to investigate the microbiological quality of tiger prawn, cockle and squid collected from a traditional market and a supermarket in Surabaya. Samples were microbiologically tested: Standard Plate Count for enumeration of total bacteria and conventional method for *Salmonella* detection comprising of selective media Bismuth Sulphite Agar and *Salmonella-Shigella* Agar. Then, isolate of Salmonella was identified microscopically and biochemically. The total bacteria of tiger prawn, cockle, and squid obtained from traditional market were $6.6x10^6$; $2.1x10^8$ and $1.6x10^7$ cfu/g, respectively, whereas those from supermarket were $2.6x10^5$; $2.6x10^7$ and $2.0x10^6$ cfu/g, respectively. The result were significant (t test). This indicated that those products in the supermarket were microbiologically better than those in traditional market. In all samples were found Salmonella; they were 30 isolates in which 2 of them were belong to *Salmonella typhi*, 7 isolates were *Salmonella paratyphi* A, 5 isolates were *Salmonella enteridis*, but 16 colonies were unidentified. In conclusion, the tiger prawn, cockle, and squid were not complied with Indonesian National Standard. It is needed better handling and sanitation.

Keywords: *microbiological quality, total-bacteria, Salmonella, tiger prawn, cockle, squid, traditional-market, supermarket*

INTRODUCTION

Tiger prawn, cockle, and squid are high perishable food since its high content of protein, other nitrogenous constituents such as free amino acids; volatile nitrogen bases like ammonia and trimethylamine; creatine; taurine; betaines; uric acid; anserine; carnosine and histamine; and moisture (Jay, 2000). Those products are rapidly spoiled microbiologically and high risk of growth of pathogenic bacteria. The bacterial biota of freshly seafood, reflect the quality of waters from which those products are taken, and contamination from the deck, handlers, and washing waters.

The bacterial biota of freshly caught seafood should be expected to reflect the waters from which these products are caught, and contamination from the deck, handlers, and washing waters. The bacteria that make up the biota of seafood are *Acinetobacter, Aeromonas, Alcaligenes, Bacillus, Corynebacterium, Enterobacter, Escherichia, Flavobacterium, Lactobacillus, Listeria,*

Microbacterium, Moraxella, Photobacterium, Pseudomonas, Psychrobacter, Shewanella, Vibrio, Weissella (Jay, 2000). Some spoilage and pathogenic bacteria species commonly found in prawn are *Achromobacter, Alcaligenes, Pseudomonas, Micrococcus, Proteus, Escherichia coli, Salmonella, Staphylococcus aureus* and *Listeria* (Hadiwiyoto, 1993; Michalowski, 2006). Microbiological standard of fresh seafood in Indonesia are total bacteria not more than 10^7 cfu/g, Coliform not more than $4x10^2$ MPN/g, *Salmonella* negative, *Staphylococcus aureus* not more than $5x10^3$ cfu/g and *Vibrio cholerae* negative (The National Agency of Drug and Food Control, 1989). Among the Gram negative rods that cause foodborne gastroenteritis, the most important are members of the genus *Salmonella*.

Salmonellas are small, Gram negative, non-sporing rods, usually motile with peritrichus flagella, facultative anaerobes, biochemically characterized by their ability to ferment glucose with the production of acid and gas, and their inability to attack lactose and sucrose. Their optimum growth temperature, as with most poisoning bacteria, is about 38°C, relatively heat sensitive being killed at 60°C in 15-20 min and they fail to grow below about 7 or 8 °C. *Salmonellas* are pathogenic bacteria induce the illness (Salmonellosis) by their death following multiplication in the host's gut and their subsequent lysis with the release of potent endototoxin. This endotoxin forms part of the membrane of the cell and is primarily responsible for the clinical symptoms. Enterotoxin produced within the human intestine may well have an important role in the disease. The principle symptoms of salmonellosis are nausea, abdominal pain, drowsiness, diarrhea and a moderate fever, dehydration may occur resulting in great thirst. This organism can invade the blood stream and thus cause a septicemia and in the more extreme cases the patient may go into a coma (Forsythe and Hayes, 1998). They are widely distributed in nature, the primary habitat is intestinal track of animals such as farm animals, reptiles, human, birds and occasionally insects. Therefore meat from these sources may be contaminated with these bacteria (Jay, 2000; Forsythe and Hayes, 1998). *Salmonellas* were found in tropical seafood such as shrimp, clams, finfish, oyster (Hatha *et al.*, 2003), mollusks and also in seawater (Martinez-Urtaza *et al.*, 2004).

Tiger prawn, cockle, and squid are seafood commonly found both at traditional market and supermarket. For generations, Indonesians have bought their food at traditional markets. Traditional market is a place where seller and buyer meet for direct transaction. Prices are not marked on items at traditional markets. Therefore, the fine art of bargaining is taken to new levels as housewives and household help try to get the cheapest prices possible. Going to the traditional market is a daily activity for Indonesian women or their household help. Most traditional markets are owned by the local government. Local governments in Indonesia usually have an Office of Market Management, or Dinas Pasar, which manages traditional markets. In Surabaya, there are 81 traditional markets which owned and operated by PD Pasar Kota Surabaya (http://www.surabaya.go.id/perdagangan.php#pasar, 2008).

Supermarket is a self-service store offering a wide variety of food and household merchandise, organized into departments. It is larger in size and has a wider selection than a traditional grocery store and it is smaller than a hypermarket. In supermarket, seller and buyer do not meet for transaction. Prices are marked on items in supermarket. In Indonesia, supermarkets are all privately owned and their permits are issued by the central government's Department of Trade. Local governments usually have no authority to refuse permits issued by the central government, although some require supermarkets to apply for local permit (Suryadarma *et al.*, 2007).

The objective of this research is to investigate the microbiological quality of tiger prawn, cockle and squid collected from a traditional market and a supermarket in Surabaya.

MATERIALS AND METHODS

Samples

Tiger prawn, cockle and squid were collected from a traditional market and a supermarket in Surabaya. Those products were aseptically packed in sterile Polyethylene plastic bag, then brought (in cool condition) to the laboratory to be analyzed of the total bacteria and Salmonella.

Media and Reagents

Plate Count Agar (MERCK 1.05463), Buffer Pepton Water (MERCK 1.07228), Selenite Cystine Broth MERCK 1.07709), Bismuth Sulphite Agar (MERCK 1.05418), *Salmonella-Shigella* Agar (MERCK 1.07667), Pepton Broth (MERCK 1.07224), Methyl Red-Voges Proskauer, Simon Citrate (MERCK 2501), Kliger Iron Agar (MERCK 3913), Semi Solid Sucrose, Lysine Iron Agar (MERCK 11640), Motility Indole Ornithine, Nutrient Agar (MERCK 1.05450), Nutrient Broth (MERCK 1.05443), Gram staining reagents (Crystal Violet, Iodium, Alcohol-Acetone, Safranin Gram stain), KOH 40%, Methyl Red, α-naphtol.

Sampling and Sample Preparation

25 g of sample were aseptically weighed and blended with 225 mL of sterile Buffer Phosphate for enumeration of total bacteria, whereas for *Salmonella* detection, 25 g of sample were aseptically weighed and blended with 225 mL of Buffer Pepton Water.

Enumeration of Total Bacteria

Aseptically weigh 25 g of sample into sterile blending container. Add 225 ml sterile Phosphate buffer and blend 5 min. Transfer homogenized mixture aseptically to sterile wide-mouth jar (500 ml). Using separate sterile pipets, prepare decimal dilutions of 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6}, 10^{-7} and 10^{-8} of sample homogenate by transferring 10 ml of previous dilution to 90 ml of phosphate buffer. Pipet 1 ml of each dilution into separate, duplicate, appropriately marked petri dishes. Add 12-15 ml plate count agar (cooled to 50 ± 1°C) to each plate within 5 min of original dilution and also for negative control plate. Mix immediately sample dilutions and agar medium thoroughly and uniformly by alternate rotation and back-and-forth motion of plates on flat level surface. Let agar solidify. Incubate promptly for 24 h at 37°C. Count the colonies which growth on the medium (Bacteriological Analytical Manual, USFDA).

Salmonella Detection, Isolation and Identification

Pre-enrichment

Aseptically weigh 25 g of sample into sterile blending container. Add 225 ml sterile Buffer Peptone Water and blend 5 min. Aseptically transfer homogenized mixture to sterile wide-mouth jar (500 ml) and let stand 60 ± 5 min at room temperature with jar securely capped, then incubated 24 hours at 37°C.

Enrichment

Gently shake incubated sample, 10 mL of the sample was inoculated to 90 mL of Selenite Cystine Broth, then incubated 24 hours at 37°C.

Detection and Isolation

Gently shake incubated sample, streak 0.1 mL of enriched sample on Bismuth Sulphite Agar (BSA) and *Salmonella-Shigella* Agar (SSA), then incubate plates 24 hours at 37°C. Examine plates for presence of colonies that may be *Salmonella*. Typical *Salmonella* colonies are brown, gray, or black colonies; sometimes they have a metallic sheen. If typical colonies are present on the BSA and SSA after 24 ± 2 h incubation, then pick 1 or more colonies for examining

microscopically. Morphological of colony and microscopic characteristic were compared to the positive control cultures (Bacteriological Analytical Manual, USFDA).

Identification

All cultures that give similar characteristics should be retained as potential *Salmonella* isolates and submitted for biochemical test. Typical colony as suspected *Salmonella* was purified to obtain the pure culture prior to biochemical test. A loopful of colony was streaked on Nutrient Agar then incubated plates 24 hours at 37°C. Perform the biochemical tests on cultures suspected *Salmonella*. Biochemical tests consist of 8 reaction tests i.e. indole, Methyl Red, Voges-Proskauer, Simon Citrate, Kliger Iron Agar, Semi Solid Sucrose, Lysine Iron Agar and Motility Indole Ornithine. The biochemical test result was compared to the positive control cultures and references.

Statistical Analysis

The data of total bacteria of each sample collected from different market was analyzed by t test with α 5%.

RESULTS AND DISCUSSION

Total Bacteria of Tiger Prawn, Cockle and Squid

The total bacteria of tiger prawn, cockle and squid collected from traditional market and supermarket in Surabaya shown in Table 1. Total bacteria of those products, in exception of tiger prawn in both markets and squid in supermarket, were higher than total bacteria of Indonesian National Standard, which was 7.00 $\log_{10}$ cfu/g. In a study of 597 of fresh seafood collected from retail stores the aerobic plate count from 4.89 to 8.43 $\log_{10}$ cfu/g (Jay, 2000).

Table 1. Total Bacteria of Tiger Prawn, Cockle and Squid Collected from Traditional Market and Supermarket in Surabaya

Sample	Total Bacteria ($\log_{10}$ cfu/g)	
	Traditional Market	Supermarket
Tiger Prawn	6.82	5.41
Cockle	8.32	7.41
Squid	7.20	6.30

Total bacteria of cockle, in both markets, were higher than of squid and of tiger prawn. The chief differences of total bacteria in those products are the quality of the waters from which those products are caught, their chemical composition, the way which they are handled, the quality of washing water and other factors. Molluskan shellfish (cockle and squid) are generally differs in their chemical composition from crustacean shellfish (tiger prawn) in having a significant content of carbohydrate material and quantity of nitrogen in their flesh. The carbohydrate is largely in the form of glycogen. Molluskan meats contain high levels of nitrogen bases particularly free arginine, aspartic, and glutamic acid, as much as do other shellfish. Liew *et al* (1998) found 4.89 log cfu/g of *Vibrio* spp. in non-heat-treated cockles and the predominant species were *V. parahaemolyticus* and *V. alginolyticus*. Squid and Vibrio fischeri have unique cooperative association. The squid has developed a specialized light-emitting organ to house the bacteria within animal's mantel cavity (McCann *et al*., 2003).

Total bacteria of each sample in traditional market were differ significantly from those in supermarket (t test), indicated that those products in supermarket were microbiologically better than those in traditional market. Generally, control of the quality of foods supplied to the traditional markets were worse than in the supermarkets since supermarkets are managed professionally by private. Quality of washing water; hygiene and temperature of room and or facilities where the

product storage and display; hygiene of employees were affected on the total bacteria of the products.

***Salmonella* Isolation and Identification of Tiger Prawn, Cockle and Squid**

Colonies suspect *Salmonella* were found on Tiger prawn, cockle and squid collected from both markets. The colonies were isolated on both selective media i.e. Bismuth Sulphite Agar and *Salmonella-Shigella* Agar. Each of colonies then was coded like shown in Table 2.

Table 2. Colonies Suspect *Salmonella* Isolated from Tiger Prawn, Cockle and Squid in Traditional Market and Supermarket

Sample	Traditional Market	Supermarket
Tiger Prawn	UTS1 UTS2 UTS3 UTS4 UTB1 UTB2	USS1 USS2 USB1 USB2
Cockle	KTS1 KTS2 KTB1 KTB2	KSS1 KSS2 KSS3 KSB1 KSB2
Squid	CTS1 CTS2 CTS3 CTS4 CTB1 CTB2	CSS1 CSS2 CSS3 CSB1 CSB2

Note: Code U=Tiger Prawn; K=Cockle; C=Squid; T=Traditional Market; S=Supermarket; S=*Salmonella-Shigella* Agar; B=Bismuth Sulphite Agar; UTS1=colony suspected *Salmonella* isolated from Tiger Prawn of Traditional Market using *Salmonella-Shigella* Agar, number 1.

All samples were contaminated by *Salmonella* that indicated those products were not in complied with the microbiological quality of Indonesian National Standard, which is negative for *Salmonella*. The source of Salmonella contaminated those products might be were waters where the products taken and or washing water. Other researchers also found *Salmonella* in 43% of 60 clam samples, 0.1% of 1264 frozen tiger prawn samples (Fraiser and Koburger, 1984; Hatha *et al.*, 2003).

Thirty isolates of Salmonella from the samples then were identified by biochemical test. Two isolates were classified to *Salmonella typhi*, 7 isolates were *Salmonella paratyphi* A, 5 isolates were *Salmonella enteridis*, but 16 colonies were unidentified. The identification results of all isolates were shown in Table 3.

Table 3. Identification of *Salmonella* Isolated from Tiger Prawn, Cockle and Squid in Traditional Market and Supermarket

Colony Code	Result of Identification
UTS1	Unidentified
UTS2	Classified to *Salmonella typhi*
UTS3	Classified to *Salmonella paratyphi A*
UTS4	Unidentified

UTB1	Classified to *Salmonella enteridis*
UTB2	Unidentified
USS1	Classified to *Salmonella typhi*
USS2	Unidentified
USB1	Classified to *Salmonella enteridis*
USB2	Classified to *Salmonella enteridis*
KTS1	Classified to Salmonella *paratyphi A*
KTS2	Unidentified
KTB1	Unidentified
KTB2	Unidentified
KSS1	Classified to *Salmonella paratyphi A*
KSS2	Classified to *Salmonella paratyphi A*
KSS3	Unidentified
KSB1	Unidentified
KSB2	Unidentified
CTS1	Unidentified
CTS2	Classified to *Salmonella paratyphi A*
CTS3	Unidentified
CTS4	Classified to *Salmonella enteridis*
CTB1	Unidentified
CTB2	Classified to *Salmonella enteridis*
CSS1	Unidentified
CSS2	Unidentified
CSS3	Unidentified
CSB1	Classified to *Salmonella paratyphi A*
CSB2	Unidentified

Other reports showed that the most frequently Salmonella isolated from cockle were classified to *Salmonella seftenberg, Salmonella typhimurium, Salmonella agona* (FDA, 2005), and *Salmonella typhi* (Trihendrokesowo *et al.*, 1989). Katsuno *et al* (2005) found that squid contaminated which was caused outbreak were contaminated by *Salmonella oranienburg*. Hatha *et al* (2003) also found that 846 samples of prawn were contaminated by *Salmonella typhimurium*.

CONCLUSIONS

The total bacteria of cockle, in both traditional market and supermarket, were higher than of squid and of tiger prawn. Total bacteria of those products obtained from traditional market were higher than those from supermarket. This indicated that those products in the supermarket were microbiologically better than those in traditional market. In all samples were found *Salmonella*; they were 30 isolates in which 2 of them were belong to *Salmonella typhi*, 7 isolates were *Salmonella paratyphi* A, 5 isolates were *Salmonella enteridis*, but 16 colonies were unidentified. In conclusion, the tiger prawn, cockle and squid were not complied with Indonesian National Standard.

REFERENCES

Food and Drug Administration. (2005). Identification of *Salmonella serovars* Isolated from Live Molluscan Shellfish and Their Significance in the Marine Environment. http://www./ncbi.nlm.nih.gov.

Forsythe, S.J. and P.R. Hayes. (1998). Food Hygiene, Microbiology and HACCP. Third Edition. Aspen Publishers, Inc. Gaithersburg, Maryland.
Fraiser, M.B. and J.A. Koburger. 1984. Incidence of *Salmonella* in Clams, Oysters, Crabs and Mullet. J. Food. Protect. 47:343-345.

Hadiwiyoto, S. (1993). Processing Technology of Fisheries Product. Liberty. Yogyakarta.

Hatha, M.A.A., T.K. Maqbool and S.S. Kumar. (2003). Microbial Quality of Shrimp Products of Export Trade Produced from Aquacultured Shrimp. International Journal of Food Microbiology Vol 82, 3, p. 213-221.

http://www.cfsan.fda.gov/~ebam/bam-toc.html, downloaded on July 7th, 2008.

http://www.surabaya.go.id/perdagangan.php#pasar, downloaded on July 7th, 2008.

Jay, J.M. (2000). Modern Food Microbiology. Sixth Edition. Aspen Publishers, Inc. Gaithersburg, Maryland.

Katsuno, S., H. Ando, T. Seo., T. Shinohara, K. Ochiai and M. Ohta. (2005). A Case of Retroperitoneal Abcess Caused by *Salmonella oranienburg*. http://www./ncbi.nlm.nih.gov.

Martinez-Urtaza, *et al.* (2004). Influence of Environmental Factors and Human Activity on the Presence of *Salmonella serovars* in a Marine Environment. Applied and Environmental Microbiology. Vol. 70, 4, p. 2089-2097.

McCann, J., E.V. Stabb, D.S. Millikan and E.G. Ruby. (2003). Population Dynamics of *Vibrio fischeri* during Infection of *Euprymna scolopes*. Appl. Environ. Microbiol. Vol 69,10, p.5928-5934.

Michalowski, C. (2006). Biological Safety of Shrimp: Invisible Problem. Foodreview Indonesia Vol. 1, 6, p. 18-21.

Suryadarma, *et al.* (2007). Impact of Supermarkets on Traditional Markets and Retailers in Indonesia's Urban Centers. The SMERU Research Institute.

The National Agency of Drug and Food Control. (1989). Maximum Limits of Microbiological Contaminants in Foods. Directorate General of Drug and Food Control No. 03726/B/VII/89.

Trihendrokesowo, *et al.* (1989). Laboratory Manual of Food Microbiology. Yogyakarta: Interuniversity Center for Food and Nutrition, Gadjah Mada University.