

ALCIE-ESK  
Program



# The 3<sup>rd</sup> International Conference of Indonesian Society for Lactic Acid Bacteria (3<sup>rd</sup> IC-ISLAB)

*Better Life with Lactic Acid Bacteria  
Exploring Novel Functions of Lactic Acid Bacteria*

Auditorium  
Faculty of Agricultural Technology  
Gadjah Mada University  
Yogyakarta, Indonesia

In collaboration with



Indonesian Society  
for Microbiology (PERMI)



Faculty of Agricultural Technology,  
Gadjah Mada University,  
Yogyakarta, Indonesia

Organized by



Indonesian Society  
for Lactic Acid Bacteria

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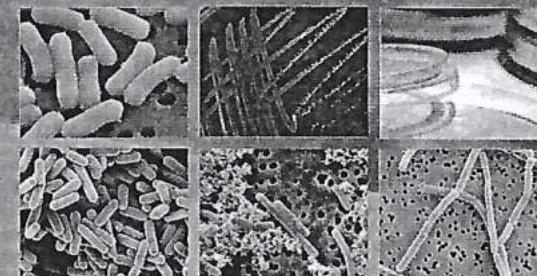


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21-22 January  
2011

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# MITRA

- PT NESTLE INDONESIA
- PT YAKULT INDONESIA PERSADA
  - PT DIPA PUSPA LABSAINS
  - PT YUMMY FOOD UTAMA
- FOOD REVIEW INDONESIA



## CONFERENCE

**"The 3<sup>rd</sup> International Conference of Indonesian Society  
for Lactic Acid Bacteria (3<sup>rd</sup> IC-ISLAB) :  
Better Life with Lactic Acid Bacteria Exploring Novel  
Functions of Lactic Acid Bacteria"**

21-22 January, 2011  
Auditorium  
Faculty of Agricultural Technology  
Gadjah Mada University  
Yogyakarta

Organized by:  
Indonesian Society for Lactic Acid Bacteria (ISLAB)

In collaboration with:  
Indonesian Society for Microbiology (PERMI)  
Faculty of Agricultural Technology, Gadjah Mada University,  
Yogyakarta, INDONESIA

## INTRODUCTION

Indonesia as a mega-diversity country has diverse microorganisms, including lactic acid bacteria. These bacteria which have varied physiological functions have been isolated and investigated associated with the benefit of human life. The utilizations of lactic acid bacteria expand into many areas of food, health, and industries. Lactic acid bacteria play many roles in traditional Indonesian fermented foods such as *tape*, *kecap*, and *asinan*. Many species and strains of lactic acid bacteria have been suggested to have many beneficial effects on the health of the digestive tract of humans. Many strains of lactic acid bacteria have been applied into probiotic products. Administration of specific strains of lactobacilli and/or bifidobacteria was found to be effective in the treatment/prevention of rotavirus, antibiotic-associated, and pathogenic diarrhea. The ability of specific probiotics to enhance immune function in infant has also been reported.

Research has been carried related to the development of science and technology in microbiological area. Lactic acid bacteria could be explored for novel function, particularly to support the health benefit for human being and other life. To support the preservation of potential microorganisms, culture collection should be managed in a good management system. Therefore, it is necessary to disseminate these research findings and experiences as well as how to manage culture collection among researcher, pediatrician, students, industries and other stake holders. Objectives of this conference are:

1. To disseminate the research achievement among the researchers;
2. To explore novel functions of lactic acid bacteria;
3. To strengthen the network among the international and national researchers as well as industrial partner.

The conference will be organized by the Indonesian Society for Lactic Acid Bacteria (ISLAB) in cooperation with the Indonesian Society for Microbiology (PERMI) and the Faculty of Agricultural Technology, Gadjah Mada University, Yogyakarta, Indonesia.

Various speakers from inside and outside the country those have expertise in this field will be present as the main speakers. It is expected that the seminar will be attended by researchers, lecturers, doctors, students, industrial society, from local and abroad.

## Preface Chairman of Organizing Committee

It is well known that several researches in area of lactic acid bacteria (LAB) have been conducted in isolation and characterization of various indigenous microorganisms linked to food fermentation which provide probiotic and prebiotic ability as well as additional synergic suppression and inhibition for spoilage and pathogenic microorganism. Many species and strain of LAB's have been suggested to provide beneficial effects on the gastrointestinal tract of human and animal. However, the most challenging effort is not only introduction the potential of indigenous microorganism but how to apply the research output into community. Therefore, the selection of the topic conference entitled *Better Life with Lactic Acid Bacteria: Exploring Novel Functions of Lactic Acid Bacteria* is one of the efforts to solve those challenging. Emphasizing of the research dissemination into society through strengthen the research networking among scientists, government, business society, and community is the main objective in this 3<sup>rd</sup> International Conference of Indonesian Society for Lactic Acid Bacteria (IC-ISLAB).

Since it was established on March 12, 2003 in the Faculty of Agricultural Technology Gadjah Mada University, the ISLAB has conducted two international conferences in 2005 and 2009. Two years ago (January 16 - 17, 2009), the 2<sup>nd</sup> IC-ISLAB was held in the Faculty of Agricultural Technology, and again this year, the 3<sup>rd</sup> international conference has also organized in this faculty. Learning from the previous conference, the increasing of participant from researchers, food and pharmaceutical manufactures, pediatricians, culture collection curators, government institutions, and students has been achieved for the number and country of origin. According to the participant list, the organizing committee has received 28 papers of oral presentation in the technical session, 51 papers of poster presentation, and 16 papers of presentation delivered by 4 Indonesian invited speaker and 12 overseas speakers (Austria, India, Japan, Korea, Malaysia, Mongolia, Pakistan, and Singapore). The scientific meeting will be arranged in 2 plenary and 6 technical sessions as well as a poster session during two days conferences. Enhancing the networking strengthen among the participant would also be built from the social gathering since breakfast prior to opening conference up to the conference dinner.

Ending this preface, on the behalf of the organizing committee I would like to express my gratitude to Faculty of Agricultural Technology Gadjah Mada University, member of Indonesian Society for Lactic Acid Bacteria, Indonesian Microbiological Society (PERMI), and several sponsored institution from PT. Yakult Indonesia Persada, PT. Nestle Indonesia, PT. Dipa Puspas Labsains, PT. Yummy Food Utama, and Food Review Indonesia. The last but not the least are distinguish speakers and participants for their tremendous effort and time spent in this conference, without all of you the conference would not be held. In the last I wish you the successful scientific meeting and hopefully come to further collaboration for your research activities.

Organizing Committee  
Chairman,

Dr.nat.techn. Francis M.C. Sigit Setyabudi, STP, MP



## Preface Chairman of ISLAB

The Indonesian Society for Lactic Acid Bacteria (ISLAB) was established at the Faculty of Agricultural Technology, Gadjah Mada University, on 12 March 2003, soon after the establishment of Asian Federation of Society for Lactic Acid Bacteria (AFSLAB) in November 2002, in Tokyo, Japan. In Indonesia, this scientific society is under the coordination of PERMI (Indonesian Society for Microbiology), while at international community, ISLAB is a member of AFSLAB which currently planning the 6<sup>th</sup> ACLAB (Asian Conference on Lactic Acid Bacteria), 8-10 September at Sapporo, Japan.

In order to disseminate the research achievement among the researchers and to strengthen networking among national and international researchers as well as industrial partner, ISLAB organizes a scientific meeting every two years. In accordance with some agreement that had been made in meeting of ISLAB representative members, 2 years ago, I would like to point some information. Several persons had been appointed as coordinator of the region, i.e., Dr. Agus Wijaya as coordinator of Sumatra, Rita Khairina of Kalimantan, Dr. Achmad Dinoto of DKI Jakarta and Jawa Barat, Dr. Yoyok B. Pramono of Jawa Tengah dan DI Yogyakarta, Dr. Agustin Krisna Wardani of Jawa Timur, and Dr. I Nengah Sujaya of Bali dan Nusa Tenggara. The main task of the coordinator is to promote ISLAB and to strengthen the research and communication network among each area.

From the effort of every of us in developing ISLAB, members of this association increased year by year, in 2005, when we held the first international conference at Bali, listed 100 members, and in second international conference at Yogyakarta, 2009 increased by approximately 150 members, currently, in the third conference, registered at around 250 members. This increase showed that research interest on lactic acid bacteria are getting higher and higher. ISLAB members are come from diverse area, represent many parts of Indonesia, ranging from Aceh of Sumatra to Kupang of Nusa Tenggara. In general, ISLAB members come from Universities, Research Institute, and few, from the industry.

To improve service to members, currently, the board issued a membership card. Hopefully, this card can be used for members properly. While to increase the communication network, website have been made, i.e., <http://islab.tp.ugm.ac.id> Hope every of us willing to use the media to share information related to lactic acid bacteria. Topics of research on lactic acid bacteria are also more varied, ranging from basic research to applied research. Many studies reveal the potential of lactic acid bacteria in traditional foods as our local wisdom. Potential indigenous isolates for probiotic agent and bacteriocin producers also among the interest research topics.

Without any support from the member, ISLAB will not develop so fast. Therefore, on this occasion, I would like to thank to all members, as well as to all overseas friends who have contribution to raise ISLAB. I also convey my big thanks to the speakers from overseas who have been willing to share knowledge and experiences to us.

I would like to express my sincere appreciation to all companies for the financial support.

At last, to distinguish guests, invited speakers, presenters and all participants, thank you for your contributions in the conference, I wish you have fruitful and wonderful time during this meeting.

Chairperson of ISLAB  
Prof. Dr. Endang S. Rahayu  
Department of Food and Agricultural Product Technology  
Faculty of Agricultural Technology  
Gadjah Mada University  
[endangsrhayu@yahoo.com](mailto:endangsrhayu@yahoo.com)

The 3<sup>rd</sup> International Conference of Indonesian Society for Lactic Acid Bacteria (3<sup>rd</sup> IC-ISLAB) :  
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## Preface Dean of Fac. Agricultural Technology, Gadjah Mada University

Living in a tropical country providing several advantages especially in the diversity of microorganisms, including those giving beneficial effect and function in human and animal life. Referring from the previous prefaces that already mentioned the background and scope of the Indonesia Society for Lactic Acid Bacteria (ISLAB) as well as the objectives of this conference, those benefit can be brought to develop the scientific interest into international contribution. Since the founding and further activities of the ISLAB are involved the role of academicians, business sector, government institution, and community (general or special profession). This involvement is certainly due to the important of building and maintaining the community networking, which is cannot be excluded in their competence and needs. Regarding to the several member of the ISLAB, the role of the academicians and researcher is holding one of main functions in maintaining the scientific interest and activities. In other hands, the role of business sector and government are also in accordance to community outreach from the scientific activities for application and legal aspects.

In this particularly event, as the Dean of Faculty of Agricultural Technology, I would like to express the welcoming and support of the 3<sup>rd</sup> International Conferences of Indonesian Society for Lactic Acid Bacteria (3<sup>rd</sup> IC-ISLAB). Collaboration that has been built and maintained with the faculty is also the role of the higher education institution for implementation of *Tridharma Perguruan Tinggi*. Therefore, I hope that the dissemination of this international meeting does not only increasing the collaboration research but also improve the education value for nation and world. It is important that research activities and community outreach should be running in accordance to science development which can strengthen the competence of higher education institution.

In the last, I wish you a good opportunity to develop the scientific and networking collaboration which can be brought to your own institution. The most important is taking responsible to build the better life for nation as it is written as the main theme of the conference entitled *Better Life with Lactic Acid Bacteria: Exploring Novel Functions of Lactic Acid Bacteria.*

Faculty of Agricultural Technology,  
Dean,

Dr. Ir. Djagal Wiseso Marseno, M.Agr.

The 3<sup>rd</sup> International Conference of Indonesian Society for Lactic Acid Bacteria (3<sup>rd</sup> IC-ISLAB) :  
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## PROGRAM

FRIDAY, January 21 <sup>st</sup> , 2011		
07:00 - 08:30	REGISTRATION, WELCOME COFFEE, AND BREAKFAST	
08:30 - 09:00	Opening Ceremony: Welcome Speech Chairman of Organizing Committee Chairman of Indonesian Society for Lactic Acid Bacteria (ISLAB) Dean of Fac. Agricultural Technology, Gadjah Mada University	
09:00 - 09:30	1. Prof. Dr. Yuan Kun Lee (The Roles of Probiotics in Gut-Brain Axis Communication Leading to Health and Diseases)	Moderator: Dr. Koesnandar
09:30 - 10:00	2. Prof. Dr. Rindit Pambayun (The Advantages and Disadvantages of Lactic Acid Bacteria: Case Study of Tempoyak Fermentation)	
10:00 - 10:15	PT. YAKULT Indonesia Persada	
10:15 - 10:45	3. Dr. Alexander G. Haslberger (Changes in Human Fecal Microbiota Due to Ageing, Nutrition and Chemotherapy and Effects of Probiotic Intervention)	Moderator: Prof. M. Juffrie, SpAK. Ph.D
10:45 - 11:15	4. Dr. Roy Sparringa (Regulatory Perspectives: Control and Development of Probiotic Foods in Indonesia)	
11:15 - 11:45	5. Dr. Badriul Hegar Syarif SpA(K)	
11:45 - 13:00	BREAK	
13:00 - 14:00	POSTER SESSION	
14:00 - 17:00	PARALLEL SESSION	
	Room A : Technical Session	Room B: Technical Session
	A1-1. Dr. Prakash M. Halami A2-1. Dr. Agus Wijaya Technical Papers	B1-1. Dr. Habib ur Rehman B2-1. Dr. Koesnandar Technical Papers
17:00 - 18:00	POSTER SESSION	
18:00 - 22:00	SOCIAL GATHERING, DINNER, AND CULTURAL EVENT (Acoustic, Javanese and Balinese Dance Performances)	

*Penelitian  
Hasrat*



SATURDAY, January 22 <sup>nd</sup> 2011		
07:00 - 08:00	MORNING COFFEE AND BREAKFAST	
08:00 - 10:00	PARALLEL SESSION	
	Room A: Technical Session A3-1. Dr. Tyas Utami Technical Papers	Room B: Technical Session B3-1. Dr. I Nengah Sujaya Technical Papers
10:00 - 10:30	PT. DIPA PUSPA LABSAINS	
10:30 - 11:00	1. Prof. Dr. Nyoman Semadi Antara (The Promising Lactic Acid Bacteria Indigenous Strains for Improving The Quality and Safety of Indigenous Food Products)	Moderator: Dr. I Nengah Sujaya
11:00 - 11:30	2. Dr. Koichi Watanabe (Current Methods for The Classification and Identification of Lactic Acid Bacteria)	
11:30 - 12:00	3. Dr. Ken Ichiro Suzuki (The Roles of Biological Resource Centers for International Cooperation in Biotechnology)	Moderator: Prof. Dr. Endang S. Rahayu
12:00 - 12:30	4. Prof. Dr. Park Yong Ha (A Functional Probiotic from Kimchi for Atopic Eczema-Dermatitis Syndrome)	
12:30 - 13:00	5. Prof. Dr. Fusao Tomita (Diversity of Lactic Acid Bacteria: Biology and Function)	
13:00 - 13:15	BEST POSTER ANNOUNCEMENT AND DOORPRIZE SESSION	
13:15 - 13:30	Closing Ceremony Chairman of PERMI	
13:30 - 14:00	LUNCH	

# Technical Session Room A Friday at R.102 (14:00 - 17:00)

Time and moderator	Note	Speaker	Title
14:00 - 15:30 (Agus Wijaya)	A1-1	Prakash M Halami <i>Tyas Utami</i>	Diversity of Lactic Acid Bacteria in Traditional Fermented Foods of India
	A1-2 ✓	Agustin Krisna Wardani	Detection of Bacteriophage Infected-Cell of <i>Lactococcus lactis</i> ssp. <i>lactis</i> C2 using Acoustic Emission Technique 1
	A1-3 ✓	Nanik Suhartatik	Kombucha as Anti Hypercholesterolemic Agent (in Vitro Study using SD rats)
	A1-4	Tri Mawarti	Characterization of Bacteriocin From <i>Pediococcus acidilactici</i> F-11 2
	A1-5 ✓	Happy Nursyam	Biopreservative Study of Starter Culture <i>Pediococcus acidilactici</i> 0094: <TGA-3 <i>Lactobacillus casei</i> NRRL-B1992 on Clarias Catfish Fermented Sausage Which Infected by <i>Listeria monocytogenes</i> ATCC-1194 3
	A1-6	Achmad Dinoto	<i>Lactobacillus fermentum</i> -Like Bacteria of Human Intestine: Structural and Functional Properties 4
15:30 - 17:00 (Agustin K. Wardani)	A2-1	Agus Wijaya	Analysis of <i>bsh</i> Gene From <i>Enterococcus faecium</i> FAIR-E 345 5
	A2-2 ✓	Indah Kuswardani	Survival of <i>L. bulgaricus</i> and <i>S. thermophilus</i> in Coconut Water Based Medium During Frozen Storage 6
	A2-3	Yoyok Budi Pramono	Total Lactic Acid Bacteria, Acidity, and Preferences Test of Yoghurt Rice Polish Added During 15 Days Refrigerated Storage 7
	A2-4 ✓	Harsojo	Condition of Bacteriology and Irradiation Decontamination of Pathogenic Bacteria in Organic Vegetable
	A2-5	Sayed Davoud Jazayeri	Survival of Bifidobacteria and Other Selected Intestinal Bacteria in TPY Medium Supplemented with Curcumin as Assessed In Vitro

Technical Session Room B Friday at R.105 (14:00 - 17:00)

Time and moderator	Note	Speaker	Tittle
14:00 - 15:30 (Osfar Sofjan)  <i>diganti / Asady</i> X	B1-1	Habib Ur Rehman	Dietary Inclusion of <i>Lactobacillus</i> Based Prebiotics, a Natural Solution to Poultry Diseases
	B1-2	Hafsa Zaneb	Dietary Supplementation of Lactobacillus-Based Probiotic Help to Alleviate The Effect of Heat Stress in Broilers
	B1-3	Sri Harimurti 8	Effect of Lactic Acid Bacteria Probiotics and Antibiotic on Broiler Performance
	B1-4	Septi Nur Hayati 7	Antibacterial Activity of Kenikir ( <i>Tagetes patula</i> L.) Leaf Extracts Against Pathogenic Bacteria and Lactic Acid Bacteria Isolated from Broiler Chicken
	B1-5	Shirchin Demberel	The Guidelines of Lactic Acid Bacteria Probiotics to Use for Farm Animal
	B1-6 ✓	Ahmad Sofyan 10	Isolation and Identification of Lactic Acid Bacteria and <i>Saccharomyces cerevisiae</i> from Natural Sources as Feed-Silage Inoculants
15:30 -17:00 (Lilis Nuraida)	B2-1	Koesnandar 11	Bacterial Lactic Acid Production of Biomass Feedstocks
	B2-2 ✓	Bambang Sulistiyanto 12	Effect of Dietary Pellet Containing of Lactic Acid Bacteria to The Microbial Performance of The Intestine of Broiler Chicks
	B2-3 ✓	Osfar Sjoifjan 13	The Growth of <i>Lactobacillus salivarius</i> Isolated from Quail Intestine in Soybean Meal Medium
	B2-4 ✓	Umi Kalsum 14	The Growth of <i>Lactobacillus salivarius</i> Isolated from Quail Intestine in Rice Bran Medium
	B2-5	Tri Ardyati 15	Identification of Lactic Acid Bacteria from Quail ( <i>Coturnix japonica</i> ) Tractus Digestivus and Their Potency to Inhibit Growth of <i>Salmonella typhimurium</i>

Technical Session Room A Saturday at R.102 (08:00 - 10:00)

Time and moderator	Note	Speaker	Tittle
08:00 - 10:00 (Yoyok B. Pramono)	A3-1	Tyas Utami <i>Praharshi Halani</i>	Fermentation of Peanut Milk by <i>Lactobacillus acidophilus</i> SNP-2 for Production of Non-Dairy Probiotic Drink
	A3-2 ✓	Sri Sumarsih 16	Stability of Lactic Acid Bacteria ( <i>Leuconostoc</i> sp) Isolated from Rucuh Fish in Liquid Medium
	A3-3 ✓	Widya Dwi Rukmi Putri 17	Determination Amylolytic Characteristic of Predominant Lactic Acid Bacteria Isolated During Growol Fermentation, in a Different Starch Medium Composition
	A3-4	Ivannela Kartika 18	Isolation and Identification of lactic acid Bacteria in Local Starter Culture of Tape (Ragi Tape)
	A3-5	Margaretha Evelyne 19	Isolation and Screening Lactic Acid Bacteria from Sayur Asin as Starter for Probiotic Beverages
	A3-6	Zulianatul Hidayah 20	Bacterial Populations During Sorghum Fermentation by Natural Fermentation and Using Lactic Acid Bacteria



Technical Session Room B Saturday at R.105 (08:00 - 10:00)

Time and moderator	Note	Speaker	Title
08:00 - 10:00 (Sri Harimurti)	B3-1	I Nengah Sujaya	Development of Indonesian Indigenous <i>Lactobacilli</i> as Probiotic for Diarrheagenic <i>Escherichia coli</i>
	B3-2 ✓	Agnes Murdiati	Production of Short Chain Fatty Acid (SCFA) of <i>Sprague Dawley</i> Rats Feeding with Sorbitol Oley Polyester (SOPE) for Fat Substitute in Diet
	B3-3 ✓	Nur Kholis	Effect of Soygurt Supplemented by <i>Lactobacillus casei</i> subsp. <i>rhamnosus</i> on Digesta Profile in Mice
	B3-4	Elok Zubaedah	Evaluation of Indigenous Probiotic Isolate From Rice Bran <i>L. Plantarum</i> B2 and Commercial Isolate <i>L. Casei</i> in Fermented Rice Bran Media Using <i>In Vivo</i> Method
	B3-5	Lilis Nuraida	Potency of Lactic Acid Bacteria Isolated from Breast Milk to Prevent Diarrhea Caused by Infection of EPEC K1.1
	B3-6	Berit Hippe	Functions of GI-Microbiota and The Quantification of Butyryl-CoA CoA Transferase Genes which Indicate The Butyrate Production Capacity in Individuals of Different Diet and Age

LIST OF POSTER

No	Authors	Abstract	
1	Andi Yuni Pratama, Chusnul Hidayat, Indyah S. Utami, Ari Wibowo, Lely Novi Andriani, and Endang S. Rahayu	Study of the Production of Soya-Yoghurt Powder by Spray Drying	P-1
2	M.N.Cahyanto, Eli M. Mafazah, Dedy Widayanto, Irliek Inastiti, and Endang S. Rahayu	Study of the Production of Yoghurt Powder by Spray Drying	P-2
3	Abubakar and E. Purwanti	Quality of Yoghurt Cow Milk Various Percentage of Addition of Starter ( <i>Streptococcus thermophilus</i> and <i>Lactobacillus bulgaricus</i> )	P-3
4	Palupi Melati Pangastuti, Endang S. Rahayu, and Tyas Utami	The Use of Carrageenan as a Stabilizer in the Fermentation of Peanut Milk Drink by <i>Lactobacillus acidophilus</i> SNP-2	P-4
5	Titiek F. Djaafar and Yeyen Prestyaning Wanita	The Effect of Sugar on Chemical and Sensoris Properties of Kerandang ( <i>Canavalia virosa</i> ) Yogurt	P-5
6	Yeyen Prestyaning Wanita and Siti Rahayu	Effects of Tempeh's Types, Blaching and Skim Addition on Consumer Acceptance of Tempeh Nuts Yoghurt	P-6
7	Siti Rahayu and Yeyen Prestyaning Wanita	The Characteristics and Sensory Evaluation of Functional Food Based on Cassava	P-7
8	Retno Utami H. and Siti Rahayu	Effect of Adding <i>Pediococcus acidilactici</i> F-11 on Antioxidant Activity and Properties of Ice Cream Sensory Sweet Potato	P-8
9	B. E. Setiani, S. Mulyani, and Nurwantoro	Total Count of Lactic Acid Bacteria, Acidity and Total Solid of Banana ( <i>Musa paradisiaca</i> sp.) Enriched Probiotic Ice Cream	P-9
10	Netty Kusumawati, Indah Kuswardani, Ignatius Srianta and Eva Setiady	Viability of <i>Lactobacillus plantarum</i> 12A2 during Processing of Probiotic Sweet-corn Ice Cream	P-10
11	Tenagy, Nurwulan Purnasari, Suparmo, and Endang S. Rahayu	Tape Ketan Fermentation with the Supplementation of Probiotic Bacteria	P-11
12	Lovita Adriani and Hendronoto Arnoldus W. Lengkey	Implication Effect to Yoghurt Quality, and Gastrointestinal Tract Ecosystem in Mice	P-12
13	Ika Rahmatul Layly, Is Helianti, and Astutiati Nurhasanah	Identification of Lactic Acid Bacteria Strains Expressing Trypsin-Like Activity Using 16s rDNA Sequence	P-13
14	Astutiati Nurhasanah, Dyah Wulansari, Trismilah, and S. Budiasih Wahyuntari	The Effect of Growth Medium Removal Prior to Transfer to Production Medium towards Medium pH and Trypsin Activity Produced by Lactic Acid Bacteria	P-14
15	Hendronoto Arnoldus W. Lengkey, Lovita Adriani Nooremma Sophiane, and Roostita L. Balia	Isolation and Identification Lactic Acid Bacteria from Raw Beef Meat	P-15

Canceled

B/S



16	Purnama Darmadji	Antibacterial Effects of Spices on Fermented Milk	P-16
✓ 17	Khairina and Marlina	Inhibition Ability of Lactic Acid Bacteria from <i>Pekasam Puka</i> on Growth of Patogen Bacteria	P-17
18	Helen J. Lawalata, Langkah Sembiring, and Endang S. Rahayu	Antimicrobial Activity of Lactic Acid Bacteria Isolated from <i>Bakasang</i> Against Pathogenic Bacteria and Spoilage Bacteria	P-18
19	Prima Retno Wikandari, Suparmo, Y. Marsono, and Endang, S. Rahayu	Cultivable Lactic Acid Bacteria Isolated from <i>Bekasam</i> (Indonesian Fermented Fish) and Their Proteolytic and Angiotensin Converting Enzyme Inhibitory Activities	P-19
20	Arifah Kusmarwati, Tyas Utami, Endang Sri Heruwati, and Endang S. Rahayu	The Quality Improvement of Rusip Product Using <i>Pediococcus acidilactici</i> F-11 as Starter Culture	P-20
✓ 21	Murtiari Eva	Effect of <i>Lactobacillus plantarum</i> FNCC 0364 Culture on Microbiological Characteristic of <i>Kembung</i> Fish "Peda"	P-21
✓ 22	Darsono, Nurliana, Rahmat Pramulya, Samangan, and Uswatun Hasanah	Product Development and Technology Roadmap (Case Study : Aceh's Specific Local Food, <i>Pliek U</i> )	P-22
✓ 23	Dyah Fitri Kusharyati, P. Maria Hendrati, and Sukanto	Diversity of Local Probiotic <i>Lactobacilli</i> in Tomato Juice and Its Potential as Functional Food	P-23
✓ 24	Samsul Rizal, Julfi Restu Amelia, and Suharyono, A.S.	Antibacterial Activity of Synbiotic Green <i>Cincau</i> Drink on Diarrhea-Causing Pathogenic Bacteria During Storage	P-24
25	Abubakar and D. Manguwidjaja	Production Bacteriocins from Lactic Acid Bacteria (LAB) Strain SCG 1223 In Molasses Media	P-25
✓ 26	Nenny Harijani	Exploration of Bacteriocin From Lactic Acid Bacteria as Antibacteria and The Effect To Therapeutical of Dairy Cattle Sub Clinic Mastitis	P-26
27	Pakartian Ayu Sugmana, Zikrina Pudjiastuti, Steffanny K. Soesilo, Dewi Nurpitasari, and Naili Zulianti	Product Utilization of Tofu Whey Fermentation by <i>Lactobacillus plantarum</i> as a Coagulant and the Effect on Tofu's Characteristics	P-27
28	Nuryati Kurniasari, Andika Sidar, Tyas Utami, and Endang S. Rahayu	The Growth of <i>Pediococcus acidilactici</i> F11 in Tofu Whey	P-28
29	Yunan K. Sya'di, M. N. Cahayanto, Tri Purwadi, Tyas Utami, and Endang S. Rahayu	Producing of 125 Liter Capacity Fermentor for Whey Fermentation Using <i>Pediococcus acidilactici</i> F11	P-29
30	Muhammad Wachid, Muhammad N. Cahyanto, Tyas Utami, and Endang S. Rahayu	Whey Fermentation by <i>Pediococcus acidilactici</i> F11 using 125 L Fermentor	P-30
31	Andika Sidar, Mariyatun, Indyah S Utami, Siti Rahayu, and Endang S. Rahayu	Tofu Characterization Using Acid and Salt Coagulant	P-31

32	Taufik Nur Setiawan, Tyas Utami, Saiful Rochdyanto, and Endang S. Rahayu	Improvement of Yield and Tofu Quality on CV. KITAGAMA through Extraction Process, Heating Soymilk and Coagulation	P-
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51-6 = 45 (poster)  
 25  
 70 technical paper.

## IS-1

## Gut-Brain Axis Communication

### The Roles of Probiotics in Gut-brain Axis Communication Leading to Health and Diseases

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#### ABSTRACT

There are growing clinical and scientific evidences to suggest that gastrointestinal microbiota and probiotics in particular modulate neuroendocrine and neurochemical response outside the gastrointestinal tract. Specifically, the absence of GI microbes resulted in reduced expression of brain-derived neurotrophic factor in the cortex and hippocampus, and an exaggerated hypothalamic-pituitary (HPA) axis response to stress. These pathogenesis of psychiatric disorders include depression, emotional symptoms of chronic fatigue syndrome, stress-induced memory dysfunction and hair loss.

Taken together these observations emphasize that alterations in the composition of gastrointestinal microbiota exert a measurable impact on certain aspects of our behavior and neurological functions, and that normalization of the microbiota can prevent behavioral abnormalities.

Neuroendocrine

Neurochemical Response

# The Advantages and Disadvantages of Lactic Acid Bacteria: Case Study on Tempoyak Fermentation

Rindit Pambayun

## ABSTRACT

Tempoyak is a lactic acid bacteria fermented condiment made from meat of durian fruit (*Durio zibethinus* Murray). It is prepared by mixing durian meat with various concentration of salt and then placed in a jar. The jar is tightly closed and kept at least seven days to let spontaneous anaerobic fermentation. The bacteria involved during fermentation commonly are *Lactobacillus plantarum*, *L. brevis*, *L. mali*, *L. fermentum*, *L. casei*, *L. corynebacterium*, *Leuconostoc mesenteroides*, *Pediococcus acidilactici*, and *Lactobacillus durianis*. Interestingly, enterococci are also found in the fermentation. Fermentation of tempoyak gives some advantages as well as disadvantages. The advantages of tempoyak fermentation are as follows: during fermentation, lactic acid bacteria produce some substances that show antimicrobial activity against pathogenic bacteria, antioxidant activity, anti-carcinogenic properties, and the product became more nutritious. On the other hand, tempoyak fermentation could produce off-flavor substances, the risk of opportunistic pathogen growth caused by poor hygiene and sanitation condition during preparation, the fastidious growth of lactic acid bacteria could lower nutrition content in tempoyak.

**Keywords:** tempoyak fermentation, lactic acid bacteria

# Changes in Human Fecal Microbiota Due to Ageing, Nutrition and Chemotherapy and Effects of Probiotic Intervention

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## ABSTRACT

Ageing, diets and medical intervention with chemotherapy or antibiotics change the composition of the gastrointestinal microbiota. These shifts in the structure of the microbiota may contribute to invasions of pathogens or disturbed gastro intestinal- or immune functions. We analyzed feces of groups of consumers with different diets and age as well as patients undergoing antibiotic chemotherapy. 16S rRNA genes of bacteria, *Bacteroides*, bifidobacteria, *Clostridium* cluster IV and XIVa as well as *C. difficile* was analyzed with TaqMan qPCR, denaturing gradient gel electrophoresis (DGGE) fingerprinting and high-throughput sequencing.

Ageing resulted in a significant reduction of the abundance and diversity of bacteria, especially clostridia. Chemotherapy induced a significant drop in the abundance of microbiota ( $p = 0.037$ ) following a single treatment the microbiota which recovered within a few days sometimes even displaying a "rebound-effect". The chemotherapeutical treatment marginally affected the *Bacteroides* while the *Clostridium* cluster IV and XIVa were significantly more sensitive to chemotherapy and antibiotic treatment. DGGE fingerprinting showed decreased diversity of *Clostridium* cluster IV and XIVa in response to chemotherapy with cluster IV diversity being particularly affected by antibiotics. The occurrence of *C. difficile* in three out of seventeen subjects was accompanied by a decrease in the genera *Bifidobacterium*, *Lactobacillus*, *Veillonella* and *Faecalibacterium prausnitzii*. *Enterococcus faecium* increased following chemotherapy. As these changes in the human gut microbiota may favor colonization with *C. difficile* and *Enterococcus faecium* feces of groups of patients receiving antibiotic treatment in combination with a probiotic therapy with *Lactobacillus casei* were compared. Differences in microbiota will be discussed.



**Regulatory Perspectives:  
Control and Development of Probiotic Foods in Indonesia**

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**ABSTRACT**

The aim of the presentation was to discuss the aspects of food safety and quality control of probiotic foods, and the development of the probiotics in Indonesia in regulatory perspectives. National Agency for Drug and Food Control (NADFC / Badan POM) as a regulator provides attention to safeguard the safety, quality, efficacy and label of the probiotic products marketed in Indonesia. The presentation included the brief Indonesian Food Law and Regulation; fact, market and research interests on probiotics; regulation on probiotics; premarket evaluation and post market control on probiotics in Indonesia. Lactic acid bacteria (LAB) are among the most important probiotic microorganisms, and *Lactobacillus* genus is the largest microorganism usage in probiotic products. Probiotics have received extensive attention from public, business and research communities, due to the potential health benefits. The pre-market evaluation by the NADFC showed that the rejection or suspension of the application for registration approval are usually due to lack of scientific evidence on human study; inappropriate scientific evidence as proposed claim, e.g. the study was not carried out in the target group claim; lack of data on the assessment of safety, interaction, and efficacy of multi-strain probiotics; probiotic information of genus, species and strain is lacking; no instruction how to keep the product, and inappropriate label. The post market control demonstrated that some producers did not maintain Good Manufacturing Practices, poor handling practices during storage and retailing, labels were over health claim, and labels were different with the registration approval documents. Indonesia as one of the mega biodiversity countries, rich in genetic resources and traditional fermented foods should have a great chance to develop probiotics through innovation. Academician, Business and Government (ABG) should strengthen interactive communication for the development of probiotics in Indonesia. NADFC welcomes academician, business, and public community to discuss regarding the development of probiotics and novel function of LAB in Indonesia. Academician and business communities should follow regulation and its guidance in early stage of development of probiotics in Indonesia to obtain registration approval easily. Indonesian Society for Lactic Acid Bacteria (ISLAB) should make initiative to work closely with stakeholders to prepare action plan with SMART target oriented program (*Specific, Measurable, Achievable, Realistic, Time Orient*).

**Intestinal Microflora and Health  
in Infants and Children**

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**ABSTRACT**

The first few years in life is the window of opportunity for physical growth and development, cognitive development, and emotion and social development. The first few years in life is a vulnerable period, in which a child's immature immune system is constantly exposed to over one billion of germs per year. A child with a poor immune system will be more vulnerable to infection. Immunological Components of Human milk not present in cow milk. A microbial world within us.

The intestinal mucosa of animals who raised in a normal environment develop a normal intestinal flora; and a normal barrier function, to protect the host. Environmental changes in life style have reduced the extent of microbial contact at an early age. These changes affect the initial establishment of the microflora. The initial composition of gut microflora, through exposure to bacteria, may be considered a key determinant in the development and regulation of immune factors. In the breast-fed infant, bifidobacteria are predominant in the flora. In contrast, in formula-fed infants similar amounts of bifidobacteria and bacteroides are found. The clear differences in the pattern of the intestinal flora indicates that human milk seems to promote the predominance of Bifidobacteria in the flora.

Probiotic, live microorganisms which when administered in adequate confer a health benefit on the host. Individual randomized controlled clinical trials in infants and children using various probiotic bacteria in the prevention of acute enteritis. The reduction in incidence, similar to that seen for treatment of diarrhea, varies significantly among studies, from approximately 15-75%. In most of the studies, the greatest effect has been reported for an effect of probiotics on rotavirus enteritis. No study to date has shown an increase (statistically significant or not) of any type of diarrhea with the use of a probiotic. A meta analyses addressing the use of probiotics for acute diarrhea provides evidence of the efficacy of probiotic supplements in reducing the duration of acute nonbacterial diarrhea by approximately 1 day. Several clinical trials have reported efficacy of probiotics for antibiotic-associated diarrhea. Percent reduction in incidence of antibiotic-associated diarrhea ranged from 4% to 71%.

Conclusion. Gastrointestinal microflora have a major role in infectious and immune mediated disease. Manipulation of GI microflora results in prevention / treatment of specific conditions.



# The Promising Lactic Acid Bacteria Indigenous Strains for Improving the Quality and Safety of Indigenous Food Product

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## ABSTRACT

Indonesia, one of Asian countries, has many kinds of fermented food which are coverage from Sumatera to Papua. Fermented food product is processed food through fermentation process, which certain microorganisms play an important role during the process. Growth of undesirable wild microorganisms may cause fermentation failure and results undesirable product. Many researches have been done to explore fermented food from the area such as *dadih* and *tempoyak* (Sumatera); *ikan peda*, *petis*, *oncom*, *tape*, *tempe* and *kecap* (Jawa); *brem*, *urutan*, *bebontot*, *brengkes* (Bali); *perahancak* and sour horse milk (NTB); *sei* (NTT); and *bekasang* (Sulawesi). From these products are also explored many kinds of useful microorganisms. Most of them are a group of lactic acid bacteria (LAB), which has been used as starter culture and probiotic as well. Using LAB as starter culture showed some benefit such as accelerate the process and ensure quality and safety of the products. During fermentation LAB produce lactic acid that lower the pH and limit the growth of pathogenic microorganisms, as well as releasing hydrolytic enzymes (lipases and proteases), able to break down macromolecules, such as lipids and proteins, resulting in the production of precursors for specific aroma. This paper is limited to discuss the promising LAB that explore from *urutan* and sour horse milk, and their potencies to be used as starter culture and other health benefit.

*Urutan* is a Balinese fermented sausage, which is based on lactic fermentation. As the dominant bacteria, lactic acid bacteria (LAB) play an important role in *urutan* fermentation. Exploration of LAB characters from *urutan* origin has been done and showed that some strains have good performance as starter culture. The contribution of starter culture on the microbial and physicochemical characteristics of *urutan* has been demonstrated. *P. acidilactici* U318 and *Lb. plantarum* U201 either as a single or co-culture starter culture, suppress the growth of *Enterobacteriaceae* and micrococci bacteria in *urutan* up to a safe level. The co-culture of these two LAB strains is a promising mix starter culture for *urutan* fermentation.

Sour horse milk is one of fermented milk produced traditionally by Bima's community which is located in Sumbawa island, West Nusa Tenggara, Indonesia. This fermented milk may be source of indigenous LAB that could be developed as probiotic. The LAB explored from this product are not pathogen, not toxic and not invasive and were able to grow well on media which have bile salt at 0.750%. Two of those strains, *Lb. acidophilus* KBc and *Lb. brevis* KBa, have ability to survive on media pH 2.5 for 3 hours and were able to adherence and colonization on gut mucosa epithel. *Lb. acidophilus* KBc and *Lb. brevis* KBa have ability to reduce cholesterol level of blood serum of rabbits on hypercholesterolemia condition significantly at 53.74% and 51.70% respectively. Based on the characteristics, *Lb. acidophilus* and *Lb. brevis*, has a promising to be used as probiotic.

House Keeping gene

# Current Methods for the Classification and Identification of Lactic Acid Bacteria

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## ABSTRACT

"Lactic Acid Bacteria (LAB)" is a generic name for Gram-positive bacteria that produce large amounts of lactic acid. The bacterial groups that make up the LAB are among the most familiar to humans, not only because of their association with a wide range of naturally fermented dairy products, grain crops, vegetables, etc., but also because they inhabit the gastrointestinal tracts of humans and animals. The LAB comprise a large bacterial group consisting of about 370 species in 33 genera of 6 families belonging phylogenetically to the order *Lactobacillales* within the phylum *Firmicutes*. Among them, the genus *Lactobacillus*, which comprises about 140 species, has a core position among the LAB.

Technical progress in the identification of microbial species is associated with developments in the approaches to microbial classification. In the early part of the 20th century, the taxonomic system was based on phenotypic features—particularly cell morphology and sugar fermentation patterns. More recently, chemotaxonomy based on peptidoglycan or fatty acid composition in the cell wall and genotypic classification based on the degree of DNA identity has been developed. Therefore, the favored method for classification is currently changing from one based on phenotypic features, which is sensitive to culture conditions or the growth phase, to direct analysis based on the intrinsic features of microbes.

16S rRNA is an essential component of the protein synthesis machinery in prokaryotic cells. Variations in the gene sequences encoding 16S rRNA form the basis of the three-domain system of biological classification (Archaea, Bacteria, and Eukaryotes), which was introduced by Woese *et al.* (1990)<sup>1)</sup>. Phylogenetic analysis based on 16S rRNA gene sequences in DDBJ/GenBank/EMBL databases has become a mainstream method in the classification and identification of bacteria. In fact, the rRNA-based method is now used as an alternative gold standard to DNA-DNA hybridization tests, which are time consuming and require expert skills.

In many cases, members of a group of closely related species are impossible to distinguish on the basis of their 16S rRNA gene sequences alone because the level of identity among the 16S rRNA gene sequences in these species is considerably higher than the recommended value for species differentiation (97%; Stackebrandt and Goebel, 1994<sup>2)</sup>). In these cases, accurate species identification requires the analysis of additional DNA sequence data, such as those derived from the 23S rRNA gene or the 16S-23S rRNA internal transcribed spacer (ITS) region. Meanwhile, the diverse species-discriminable sequences that have accumulated in the V1-V3 variable regions of the 16S rRNA gene are allowing the development of species-specific primers or probes with which to perform rapid and reliable, culture-independent analysis—particularly quantitative PCR or fluorescent *in situ* hybridization (FISH)—of microbial communities in a wide variety of fields.



In recent years, a number of important methods have been developed. These include an array of molecular-biology-based techniques used in multilocus sequence analysis (MLSA), which is a method based on the DNA sequences of a combination of several housekeeping genes that encode proteins usually essential for the maintenance of cellular function, and a method of rapid bacterial identification by matrix-assisted laser desorption ionization - time-of-flight mass spectrometry (MALDI-TOF MS) using ribosomal proteins as biomarkers.

I will discuss the current situation and problems with respect to molecular methods based on 16S rRNA gene sequences, and will discuss current high-resolution methods of identifying species and strains of LAB, which differ from methods relying on 16S rRNA gene sequences.

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## The Roles of Biological Resource Centers for International Cooperation in Biotechnology

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#### ABSTRACT

Biological Resource Center (BRC) is an essential infrastructure for the life sciences and biotechnology as the depository and supplier of a wide variety of biological resources<sup>1)</sup>. OECD recognized the importance of the quality of BRCs and published the Best Practice Guidelines for BRCs dealing with the quality management, biosecurity matters, capacity building, preservation and data management of biological materials<sup>2)</sup>. Culture collection (CC) is one of the activities of BRCs.

On such background, NBRC was established to facilitate the biotechnological research and development in academia and industry communities in 2002<sup>3)</sup>. The essential roles of CCs for microbiology are collection, preservation and supply of (1) reference organisms used for quality control and standardized tests, (2) taxonomic type strains of prokaryotes (bacteria and archaea) and yeasts and (3) wide variety of microorganisms with undiscovered potential for research use. NBRC holds 25,209 microbial strains including bacteria actinomycetes, archaea, bacteriophages, filamentous fungi, yeasts and microalgae (as of March, 2010) and distributed 8,320 microbial cultures in 2009FY. Supply of reference microorganisms requires highly reproducible quality of the specified strains. About 37% of distribution of the microbial strains is used for this purpose. NBRC has been certified by ISO 9001 since 2006 in the quality management system.

When new species of prokaryotes or yeasts are proposed, the type strains should be deposited to two or more public CCs in different countries and be indicated their accession numbers in the description. The culture collection must issue the certificate of the availability of the type strains. To confirm the identity of the strains, rRNA sequences should be determined by both the depositor and the collection. Responsibility of culture collections to the microbial taxonomy community has become high. Taxonomic techniques and knowledge are required for the maintenance of the qualities of BRC.

Genomic DNAs of some microorganisms are also distributed to the users for their convenience in molecular biological research. NITE has been analyzing the whole genome sequences of various important microorganisms for industry and taxonomy and providing the information from the website.

Not only for the scientific interest, BRCs are requested to assist the users by supplying authentic materials to work in compliance with laws and regulations for biosafety, quarantine and intellectual properties rights. NITE also has a function of patent microorganism depository as an international depository authority (IDA) under the Budapest Treaty managed by WIPO.

BRC/culture collection networks, such as FORKOMIKRO of Indonesia and JSCC (Japan Society for Culture Collections) are useful to cover the diverse microbial resources in the country. In addition, recently we have to pay attention



to the Convention on Biological Diversity (CBD) and the related national regulations. In 2010, COP10 meeting of CBD adopted "Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity"<sup>(4)</sup>. This indicates the concern of the government to the access and benefit sharing of genetic resources. International network of BRCs is expected to contribute to the international transfer of biological materials not to interrupt international cooperative studies.

Asian Consortium for Conservation and Sustainable Utilization of Microbial Resources (ACM) with culture collections and microbiologists of twelve Asian countries has established in 2004. ACM aims to exchange information of the current status of national laws and regulations for biological materials and to encourage international cooperation.

The roles of BRC/CC have become more important for the handling of biological resources.

#### References

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- 4) <https://www.cbd.int/cop/cop-10/doc/advance-final-unedited-texts/advance-unedited-version-ABS-Protocol-footnote-en.doc>

#### A Functional Probiotic from Kimchi for Atopic Eczema-Dermatitis Syndrome

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#### ABSTRACT

*Lactobacillus sakei* predominates in kimjang kimchi. The purpose of this study was to investigate the clinical effect of *L. Sakei* Probio 65 supplementation in children with atopic eczema-dermatitis syndrome (AEDS). *L. Sakei* Probio 65 was isolated from kimchi, a traditional Korean fermented vegetable food. This strain was resistant to gastric acidity, bile, and several antibiotics and possessed antimicrobial activity against a range of pathogenic microorganisms. To investigate whether the probiotic activity of *L. Sakei* Probio 65 was effective for treating allergic dermatitis, the organism was supplied to mice triggered by allergen (1-chloro-2,4-dinitrobenzene). Mice that received *L. Sakei* Probio 65 showed a more rapid recovery compared to control mice, as assessed by visual evaluation of the severity of allergic dermatitis and levels of immunoglobulin (Ig) E and interleukin (IL)-4. *L. Sakei* Probio 65 exhibited good probiotic properties *in vitro* and in mice and was effective in reducing allergen-induced skin inflammation through the regulation of both elevated IgE and IL-4 in sensitized mice.

In a double-blind, placebo-controlled trial, children aged 2 to 10 years with AEDS with a minimum SCORing of Atopic Dermatitis (SCORAD) score of 25 were randomized to receive either daily *L. sakei* Probio 65 or daily placebo supplementation for 12 weeks. Changes in SCORAD scores and serum chemokine levels from baseline were evaluated. Eighty-eight children were enrolled, and 45 were allocated to probiotic treatment. Seventy-five children completed the study, with 4 dropouts in the probiotic group and 9 in the placebo group. The bacterial preparation contained microcrystalline cellulose (1.76 g) as a carrier and freeze-dried *L. sakei* Probio 65. A dose of  $5 \times 10^9$  colony forming units of *L. sakei* Probio 65 or an identical-appearing placebo preparation was given twice daily. The placebo preparation consisted of microcrystalline cellulose, same as the probiotic preparation. At week 12, SCORAD total scores adjusted by pretreatment values were lower after probiotic treatment than after placebo treatment. There was a 31% (13.1-point) improvement in mean disease activity with probiotic use compared with a 13% (5.2-point) improvement with placebo use. Significant differences in favor of probiotic treatment were also observed in proportions of patients achieving improvement of at least 30% and 50%. Compared with placebo,



probiotic administration was associated with lower pretreatment-adjusted serum levels of CCL17 and CCL27, which were significantly correlated with SCORAD total score.

Supplementation of *L sakei* Probio 65 in children with AEDS was associated with a substantial clinical improvement and a significant decrease in chemokine levels, reflecting the severity of AEDS.

## Diversity of Lactic Acid Bacteria: Biology and Function

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### ABSTRACT

Lactic acid bacteria (LAB) is defined as those producing lactic acid and consist of diverse genera and their physiological functions are also found to be diverse. It has been also know that LAB have been closely associated with our life, especially with our health and food. According to the recent discoveries related to activity of LAB, the utilities of LAB expand into many areas of "food and health science".

According to recent progresses in taxonomy and ecology of LAB, their kinds seem to be unlimited, showing many genera are proposing almost every day. These progresses are due to new ways of isolating LAB and also expansion of ecological researched. In addition to them, resent studies of diversity of biological functions among the same or the very similar species, namely functional diversity of LAB at strain level attracted many attentions such as immunogenic or other physiological functions.

These can be applied for diverse probiotics. The concept of probiotics has originated in Western world, but actual products and their effects have originated in East, especially in Japan. This has further developed into creating the concept of "food of special health use=FOSHU" in Japan. Japan has also contributed greatly science on microbiota in digestive systems in human and animal. Microbiota in digestive systems have been recognized to be very important factors or keys to our health. In these areas their diversity in physiological functions attracted much interest in their differences at strain levels. Thus, taxonomic studies of LAB are becoming more and more important for their intellectual property rights. Therefore, the rapid progress in science and technology on LAB can also been seen from patent applications, i.e., patents related to LAB in the last 10 years proved to be many, for example, immune modulation 95, physiological functions 56, cholesterol 33, cosmetics 33, high blood pressure 17, diets 10, vaccine 10, obesity 10 etc.

Research on LAB often deals with the complex systems and this may cause difficulty of understanding and interpretation of experiments, but in another words, these give us very challenging problems and are the treasure box of new discoveries, especially in the areas of diversity of LAB in many levels.



## Diversity of Lactic Acid Bacteria in Traditional Fermented Foods of India

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## ABSTRACT

Lactic acid bacteria (LAB) represents economically important group of microorganisms involved in food fermentation and preservation. These are low to moderate G+C group of microaerophilic Gram-positive bacteria comprising diverse species of *Carnobacterium* (Cn), *Enterococcus* (E), *Lactobacillus* (Lb), *Lactococcus* (Lc), *Leuconostoc* (Leu), *Oenococcus* (O), *Pediococcus* (P), *Streptococcus* (S), *Tetragenococcus* (T), *Vagococcus* (V) and *Weissella* (W) etc are generally associated with food. Recent development of very sensitive, rapid, automated molecular detection methods have revolutionized taxonomy of LAB and broadened our understanding in their high diversity in naturally fermented foods.

Detection of Bacteriophage Infected-Cell of *Lactococcus lactis* ssp. *lactis* C2 Using Acoustic Emission TechniqueAgustin Krisna Wardani<sup>1</sup>, John M. Stencel<sup>2</sup>, and Clair Hicks<sup>3</sup><sup>1</sup>Faculty of Agricultural Technology, University of Brawijaya, Malang 65145<sup>2</sup>Tribo Flow Separations, 1525 Bull Lea Road, Suite 10, Lexington, KY 40511<sup>3</sup>Department of Animal and Food Sciences, University of Kentucky, Lexington, KY 40506

## ABSTRACT

The objective of this study was to distinguish two lactococcal bacteriophage sk1 and ml3 by acoustic emission technique. In this technique, the signal was emitted from growth medium where *L. lactis* ssp. *lactis* C2 was infected with phages sk1 or ml3. The signal was monitored using contact piezoelectric sensors attached to the sides of the growth chambers. The two sensors (5 to 50 kHz range) had individual characteristic and internal amplification mechanisms that were calibrated and adjusted to minimize background noise. Sound intensity from the growth chambers was measured in attojoules ( $aJ = 10^{-18}$  Joules) and plotted as the energy rate-per-detected acoustic wave. Acoustic peaks considered significant and beyond internal or external generated noise were those having greater than  $\pm 3$  times the sigma value of the general variation in acoustic intensity over the entire data set of each test. The acoustic data showed that energy rate from control tests in which *L. lactis* ssp. *lactis* C2 was grown without phage sk1 or phage ml3 infections contained no acoustic peaks with intensities that exceeded the  $\pm 3$  sigma standard. On the contrary, multiple acoustic peaks with intensities that exceeded  $\pm 3$  sigma were observed when phage sk1 or ml3 infected *L. lactis* ssp. *lactis* C2 culture. A significant difference between timing acoustic peaks of phage sk1 and ml3 were also observed. The first peaks for phage sk1 appeared at  $33.2 \pm 4.4$  min, whereas the first peak for phage ml3 appeared 40 min. Thus, these two phages could be distinguished by acoustic emission monitoring during phage infection of the bacteria. This new method can be performed in real time therefore allow fast and early detection of phage infected bacteria.

**Keywords:** acoustic emission, *Lactococcus lactis*, phage, piezoelectric sensors



### Kombucha as Anti Hypercholesterolemic Agent (in Vitro Study using SD rats)

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#### ABSTRACT

From the previous research, it got three kinds of process for made Kombucha that would have high content of glucuronic acid, a substance that could neutralized cholesterol deposit, change it to another compound that more soluble in water and produced in liver. From this *optimization* process, we could get three kinds of kombucha with three different kinds of condition process, e.i. process I (8,23 ppm of glucuronic acid using arenga sugar); process II (8,86 ppm, using palm sugar) and process III (8.73 ppm, using cane sugar).

In this research, this three kinds of products (Kombucha A, B, C) would be tested for the ability to decline blood cholesterol plasma using male Sprague Dawley mice. Cholesterol value decline as much as 49% (decrease 117 mg/dL); 45% (49,1 mg/dL); and 52% (51,6 mg/dL) for Kombucha A, B, and C, and meanwhile placebo rat has no significant differences in cholesterol level during treatment. Triglyceride value decline 21%, 18%, and 27%; HDL-C value increase 21%, 18%, and 27%; and LDL decrease 85%, 75%, and 91%. Mice did not have any change in body weight till the end of treatment.

**Keywords:** fermented food, glucuronic acid, cholesterol

### Characterization of Bacteriocin From *Pediococcus acidilactici* F-11

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#### ABSTRACT

The bacteriocin PAF-11 characterization is required prior to its application in an industry. This characterization study used *P. acidilactici* F-11 and *P. acidilactici* LB 42 as the bacteriocin producing and indicator strain respectively. Both strains were obtained from the Food Nutrition Culture Collection, UGM. The *P. acidilactici* F-11 was grown to produce its bacteriocin in TGE liquid medium, pH 6.5 at 37 °C incubation for 18 hours. The bacteriocin was extracted and purified according to the adsorption-desorption methods and its activity was determined by the well-inhibition methods. Then the bacteriocin stability in term of temperature and storage condition was characterized. Additional plasmid novobiocin curing and PCR experiment were also carried out to characterize the putative bacteriocin gene. The purified bacteriocin was stable at pH range of 3 - 8 and autoclaving (121°C for 15 minutes). It was also stable during 11 to 13 week storage at 30°C and 4°C respectively. The putative bacteriocin gene was carried in the 12 Kb plasmid as an amplified 256 bp DNA fragment revealed specifically by the pediocin specific primer in the PCR experiment.



**Biopreservative Study of Starter Culture *Pediococcus acidilactici* 0094: <TGA-3 *Lactobacillus casei* NRRL-B1992 on *Clarias* Catfish Fermented Sausage Which Infected by *Listeria monocytogenes* ATCC-1194**

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**ABSTRACT**

The prevalence of *Listeria monocytogenes* in processed fish products is higher than livestock or poultry meat. Until now "lethal dose" *Listeria monocytogenes* is not known with certainty, and this bacterial infection can lead to encephalitis, meningitis, septicemia, and mastitis, and even death. This research is a study about the use of lactic acid bacteria starter cultures *Pediococcus acidilactici* and *Lactobacillus casei* individually or in combination as the biopreservative of *Clarias* catfish fermented sausage which infected by *Listeria monocytogenes* during ripening of 28 days at 15-22 °C the incubation temperature. The result showed that biopreservatif component contained in all forms of experimental sausages containing of alcohols, ketones, fatty acids, esters of fatty acids, phenols, benzene and other volatile compounds, where the phenol is the majority. The greater ratio of C15:0/C17:0 in the fermentation of *clarias* catfish sausage, the growth of *Listeria monocytogenes* are fewer and fewer. Fermented sausages using a combination of *Pediococcus acidilactici* and *Lactobacillus casei* starter has a ratio C15:0/C17:0 largest, and is able to turn off the growth of *Listeria monocytogenes*. The ratio C15:0/C17:0 with a value of 79.84 represents a lethal dose of *Listeria monocytogenes* at a temperature of 15 to 21.2 °C incubation in vitro.

**Keywords:** biopreservatif, lactic acid bacteria, starter culture, lethal dose, and *Listeria monocytogenes*.

***Lactobacillus Fermentum*-Like Bacteria of Human Intestine: Structural and Functional Properties**

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**ABSTRACT**

*Lactobacillus fermentum*, a member of lactic acid bacteria (LAB) group, is commonly found in human and animal intestine as normal microbiota and probably plays important roles to the host. Many *Lactobacillus*-like strains were successfully recovered from human feces by conventional method using various culture media. The 16S ribosomal DNA analysis clarified the structural property and taxonomy status of isolated bacterial strains confirming that those strains are related to *L. fermentum* with the highest similarity between 96 to 99% (namely *L. fermentum*-like bacteria). Several assessments to *L. fermentum*-like bacterial strains confirmed the beneficial functional properties, such as the capability of reducing cholesterol and producing exopolysaccharide. Recently, cell immobilization by entrapping the cells of *L. fermentum*-like bacteria into suitable matrix (encapsulation) is being intensively investigated to protect the bacterial viability and activity against environmental barriers. In the future, encapsulated *L. fermentum*-like strain is predicted to be useful either as probiotic bacteria or as biological agent on microbial bioprocess to food and pharmaceutical industries. Here, the structural and functional properties of *L. fermentum*-like bacteria are described to help us for better understanding about the biology of this organism.

**Keywords:** *Lactobacillus fermentum*, human intestine, probiotic, cholesterol reduction, exopolysaccharide production.



Analysis of *bsh* Gene From *Enterococcus faecium* FAIR-E 345Agus Wijaya<sup>1\*</sup>, Ingrid Specht<sup>2</sup>, Wilhelm H. Holzapfel<sup>3</sup>, and Charles M.A.P. Franz<sup>2</sup><sup>1</sup>Jurusan Teknologi Pertanian, Fakultas Pertanian, Universitas Sriwijaya<sup>2</sup>Max Rubner Institute, Haid-und-Neu-Str. 9, D-76137 Karlsruhe, Germany<sup>3</sup>Global University Handong, Handong, South Korea

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## ABSTRACT

A *bsh* gene from chromosomal DNA fragments of 2.5-4.0 kbp length, isolated from *Enterococcus faecium* FAIR-E 345, has been cloned and expressed. The insert in the plasmid pAW01 contained by this clone was completely sequenced in both directions. Analysis of the DNA sequence revealed the presence of one open reading frame (ORF) encoding a protein of 324 amino acids with an isoelectric point of 4.877. A presumptive ribosome binding site (GGAGGAA) was located 8 bases upstream of the ATG start codon from this ORF. Presumptive -10 (TATAGT) and -35 (TTGATA) promoter sequences were located upstream of this ribosomal binding site (RBS). A possible terminator with dyad symmetry occurred in 164 bp downstream of the TGA stop codon of this ORF. A databank searching indicated that the amino acid sequence deduced from this ORF had the highest homology with the identical BSH (bile salt hydrolase) protein sequences from other bacteria. Interestingly, the BSH protein from *E. faecium* FAIR-E 345 also had some homology with the penicillin V acylase (Pva) of *Bacillus sphaericus* (32.7% identity) (Suresh et al., 1999).

**Keywords:** *bsh* gene, *Enterococcus faecium*, amino acid homology

Survival of *L. bulgaricus* and *S. thermophilus* in Coconut Water Based Medium During Frozen StorageIndah Kuswardani, Netty Kusumawati, and M. I. Sabrina  
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## ABSTRACT

While frozen culture preparation is the simplest and cheapest way to supply yogurt starters for home industries, the decrease of *L. bulgaricus* and *S. thermophilus*'s viability during the freezing and frozen storage stage will reduce the yogurt's quality. Therefore, using an appropriate media that has cryoprotectant function is very important. Coconut water based medium is suitable for LAB growth and the added skim milk will protect cells from damage during freezing and storage in frozen state. To produce frozen culture with high viability, examinations of skim milk addition and time length of storage's impact to the cells' viability is needed. The aims of this work were to study the effects of addition of skim milk into coconut water based medium and the storage time on the viability of frozen culture of lactic acid bacteria.

The experiment was based on Factorial Randomized Block Design (RBD) with two factors: i) the concentration of skim milk of 0%, 2.5%, 5% and 7.5%, and ii) storage time of 5, 10, 15, 20, 25 and 30 days. The higher the skim milk's concentration was the better the cells' viability would be. The longer the frozen storage time caused lower cells' viability. The cells' viability sharply decreased after freezing. It was shown that the cells' viability decreased significantly in the first five days of storage. After that, longer storage time only gave small reduction in cell viability.

**Keywords:** yoghurt culture, cryoprotectant, freezing, storage



### Total Lactic Acid Bacteria, Acidity, and Preferences Test of Yoghurt Rice Polish Added During 15 Days Refrigerated Storage

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#### ABSTRACT

Yoghurt rice polish added is new innovative fermented food by addition of rice polish in yoghurt. The study was design to introduce potential addition of rice polish to improve its functionality properties by enhancement of dietary fiber in yoghurt fermentation. Measurement in this research were total lactic acid bacteria, acidity, and preferences test during 15 days refrigerated storage.

Result indicated that total lactic acid bacteria about  $10^8$  -  $10^9$  CFU/ml, acidity about 0,48 - 0,67 %, and its was not to influence of preferences test. Duration of refrigerated storage was to increase of total LAB and acidity.

**Keywords :** yoghurt, rice polish, total lactic acid bacteria, acidity, preferences test

### Condition and Irradiation Decontamination of Pathogenic Bacterial in Organic Vegetables

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#### ABSTRACT

An experiment has been conducted to compare the initial microbes contamination between organic and non-organic vegetables and also to study the radioresistance of some pathogenic bacteria on some organic vegetables. The vegetables which observed are Chinese cabbage/Bokchoy (*Brassica sinensis*), Spinach (*Amaranthus sp*), Kangkung (*Ipomoea aquatica*), Tomato (*Solanum lycopersicum*) and Beans (*Phaseolus vulgaris*). Organic vegetables are bought at supermarket. The measured parameters are the amount of total aerob bacteria, total coliform, *Escherichia coli*, *Staphylococcus* and identification of *Salmonella*. Another experiment has been conducted to study the effect of irradiation on pathogenic bacteria which inoculated on some organic vegetable. Some pathogenic bacteria such as, *E. coli* 0157, *Listeria monocytogenes*, *Salmonella typhimurium*, and *E. coli* were inoculated on organic vegetable. Irradiation was done with the dose of 0; 0,1; 0,2; 0,3 and 0,4 kGy. The irradiation was done at a multipurpose panoramic batch irradiator (IRPA SENA) with a dose rate of 1.149 kGy/h. The results showed no *Salmonella* was detected in all samples observed. The initial contamination of aerob bacteria were found in the range from  $1.50 \times 10^6$  up to  $7.20 \times 10^6$  cfu/g, while in non-organic vegetables were in the range from  $1.02 \times 10^5$  up to  $8.81 \times 10^6$  cfu/g. The total coliform bacteria were found in the range from  $2.85 \times 10^5$  up to  $12.25 \times 10^5$  cfu/g, while in non-organic vegetables were in the range  $2.62 \times 10^5$  up to  $7.13 \times 10^6$  cfu/g. The total *Staphylococcus* bacteria were found in the range from  $2.00 \times 10^2$  dan  $5.00 \times 10^3$  cfu/g, while in non-organic vegetables were in range  $4.1 \times 10^3$  up to  $2.81 \times 10^4$  cfu/g. D10 value of pathogenic bacteria were in the range from 0.08 up to 0.38 kGy. *L. monocytogenes* was the most radioresistant bacteria among the others.

**Keywords :** organic vegetable, microbes, radioresistant bacteria.



# Survival of Bifidobacteria and Other Selected Intestinal Bacteria in TPY Medium Supplemented With Curcumin as Assessed *In Vitro*

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## ABSTRACT

The growth of two *Bifidobacterium* strains (*Bifidobacterium longum* BB536, *Bifidobacterium pseudocatenulatum* G4) and other selected intestinal bacteria (*Lactobacillus acidophilus*, *Lactobacillus casei* Shirota, *Enterococcus faecalis* JCM 5803 and *Escherichia coli* K-12) were studied in TPY medium containing various concentrations of curcumin (0.025, 0.050, 0.075 and 0.1% (w/v)). Viable cell counts of the bacteria and their pH medium were determined during incubation period of 12h, 24h, 36h and 48h at 37°C. In the presence of curcumin, cultures showed various degrees of growth inhibition compared to in TPY medium without curcumin. *E. faecalis* and *B. longum* BB536 were survived well than the other bacteria tested. Among the bacteria tested, *L. acidophilus* recorded the most sensitive to curcumin. The presence of curcumin did not change the pH of the medium as compared to the basal TPY. The ability of the bacteria to degrade curcumin after 48h incubation was studied using spectrophotometric method at 400.4 nm wavelength. The percentage reduction of 0.025 and 0.050 % of curcumin was 56-60 and 18-24 %, respectively, and for two other concentrations which were 0.075 and 0.1% was 15-16 and 12-14 %, respectively.

# Fermentation of Peanut Milk by *Lactobacillus acidophilus* SNP-2 for Production of Non-Dairy Probiotic Drink

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## ABSTRACT

Production of fermented peanut milk drink by *Lactobacillus acidophilus* SNP2 using equipments that can be applied in small scale industry was investigated. Peanut milk was extracted using equipments that belong to small scale industry of tofu. Peanut milk inoculated with *Lactobacillus acidophilus* SNP2 was incubated at 37°C for 18 h in incubator that made for small scale industry. After fermentation time, the product contained lactic acid bacteria  $9.4 \times 10^8$  CFU/ml, with 0.32% titratable acidity and pH 3.86. Sensory evaluation result showed that more than 80% panelis accepted the taste of product with addition of 6-10% sugar. The numbers of lactic acid bacteria showed no marked change in the fermented peanut milk drinks during storage at 4°C for 28 days, and still sufficiently high to exert beneficial effects in the host. After storage for 28 days, fermented peanut milk drink contains lactic acid bacteria  $6.9 \times 10^8$  CFU/ml, 0.66 % titratable acid with the pH 3.5. Fermented peanut milk drink can be used as a probiotic carrier. Fermentation of peanut milk drink by *Lactobacillus acidophilus* SNP-2 for production of non-dairy probiotic drink can be applied to small scale industry.

**Keywords:** lactic acid bacteria, probiotic, fermented peanut milk



### Stability of Lactic Acid Bacteria (*Leuconostoc* sp) Isolated From Rucah Fish in Liquid Medium)

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#### ABSTRACT

Lactic acid bacteria is one of the natural microbiota which widely used as fermentation agents. The purpose of this study is to examine the stability properties of lactic acid bacteria isolated from *rucah* fish in liquid medium. This research is compiled with the Complete Random Design with 4 treatments and 3 replications of each experimental five units. Parameters observed were total number and stability properties of *Leuconostoc* sp isolate which known as lactic acid bacteria. The results obtained total number of *Leuconostoc* sp isolate were significantly decreased ( $p < 0.05$ ) during storage. Stability properties of *Leuconostoc* sp isolate were not affected by the time of storage.

**Keywords:** lactic acid bacteria, liquid medium, storage

### Determination Amylolytic Characteristic of Predominant Lactic Acid Bacteria Isolated During Growol Fermentation, in a Different Starch Medium Composition

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#### ABSTRACT

In order to achieve efficient lactic acid production from starch, fermentation of a various composition starch medium by lactic acid bacteria was examined in this study. Many strains of *Lactobacillus plantarum* isolated from growol fermentation, *Lactobacillus plantarum* subsp. *plantarum* NBRC 15891 and *Lactobacillus amylophilus* NBRC 15881 were used as starter cultures in starch basis medium, i.e, basal, basal-starch, enriched basal-starch with polypeptone and yeast extract. *Lactobacillus plantarum* UA3, AA2, AA11 showed the highest cells growth compare to both reference strains, but *Lactobacillus amylophilus* NBRC 15881 showed a greater ability to degrade starch indicated by decreasing of pH and starch content of fermented substrate. Enriched medium with polypeptone and yeast extract could generate the growth and starch degradation capabilities for all types of lactic acid bacteria were used.

**Keywords :** growol, lactic acid bacteria, amylolytic characteristics.



# Isolation and Identification of Lactic Acid Bacteria from Local Starter Culture of Tape (Ragi Tape)

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## ABSTRACT

Indigenous fermented foods have become new interest and consequently provided new subjects for intellectual creation these few years. One of fermented food which is very well-known in Indonesia and some other countries in Asia is *tape*. *Tape ketan* is prepared by fermenting glutinous rice with powdered ragi (starter culture). Some studies reported the absence of lactic acid bacteria (LAB) in starter culture (*ragi tape*) but others reported the effect of LAB in final product of *tape*. The aim of this research is to isolate LAB from the local starters which gave the best *tape* products in Indonesia. *Ragi tape NKL (Na Kok Liong)* was obtained from traditional market in Magelang, Central Java. The preliminary studies of this research resulted in fifteen species of unknown LAB. All species formed clear zone in MRS with the addition of CaCO<sub>3</sub>. But there were five species which produced bubbles in catalase test. Therefore, the others ten species were subjected to gram staining. Those ten species gave positive result for gram staining. Since it was showed as coccus form so it is assumed that Na Kok Liong starter culture possibly contains genus of *Lactococcus*, *Streptococcus*, *Leuconostoc*, *Pediococcus* or *Aerococcus*. Further steps of testing method were needed to identify the exact genus of LAB in Na Kok Liong starter culture.

**Keywords :** LAB, starter culture, tape, NKL (Na Kok Liong)

# Isolation and Screening Lactic Acid Bacteria from Sayur Asin as Starter for Probiotic Beverages

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## ABSTRACT

Sayur asin is one of lactic acid bacteria's habitats. This food is a kind of fermented food which made of sawi pahit (*Brassica juncea* var. Czern). The aims of this research are to isolate and to identify lactic acid bacteria from sayur asin (fermented *Brassica juncea* var. Czern) and to screening lactic acid bacteria which have probiotic properties (resistant to bile salt, resistant to acid environment / low pH, and antimicrobial activity). The sample of this study is the water immersion of sayur asin, which have been found to be a waste, while the vegetables are consumed. Out of 25 isolates, three of them were observed as potential probiotics. These isolates were resistant to acid environment (pH 3), resistant to 0,3 % bile salt concentration, and have antimicrobial activity against *Escherichia coli* ATCC 25922 and *Staphylococcus aureus* ATCC 25923. It was concluded that lactic acid bacteria from sayur asin have probiotic properties, so that can be used as starter for probiotic beverages.



# Bacterial Populations during Sorghum Fermentation by Natural Fermentation and Using Lactic Acid Bacteria

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## ABSTRACT

Population of selected bacteria and production in sorghum flours were investigated during natural fermentation at 24 h and using starter cultures of *Streptococcus thermophilus* FNCC 040 and *Lactobacillus acidophilus* FNCC 050. In all fermentation, a decrease in pH was noticed, and an increase in titrable acidity was detected. The growth of coliforms were faster compare to that lactic acid bacteria during spontaneous sorghum flours fermentation up to 12 h, after that their number decreased and lactic acid bacteria became dominant until the end of fermentation. Initial number of proteolytic bacteria increase slightly and decrease to  $1.2 \times 10^2$  cfu/ml at the end of fermentation. The use of *S. thermophilus* as a starter culture increase the population of lactic acid bacteria and proteolytic bacteria, and also inhibited the growth of coliforms during fermentation of sorghum flours. Addition of *L. acidophilus* significantly reduce the population of coliforms in the fermented sorghum flours. Coliforms were almost not detected after 16 h fermentation.

**Keywords:** Sorghum, fermentation, lactic acid bacteria, proteolytic bacteria, coliforms.

# Dietary Inclusion of *Lactobacillus* Based Prebiotics, a Natural Solution to Poultry Diseases

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## ABSTRACT

The study is aimed at reviewing the potential benefits of lactobacillus probiotic supplementation in poultry. Elucidating probiotic properties of lactobacillus bacteria in poultry that includes its capacity to adhere to the gut epithelial tissue, the competitive exclusion of pathogenic bacteria, and tolerance to gastric and bile juice. Over 70 species of lactobacilli have been recognized using modern molecular techniques, in past most of them could not be identified. The common lactobacilli isolated from gut are *Lactobacillus brevis*, *L. casei*, *L. acidophilus*, *L. plantarum*, *L. fermentum* and *L. salivarius*. In newly hatched broilers the swift establishment of friendly gut microbiota is of great concern. The management of intestinal microflora by the administration of lactobacillus probiotics, has been practiced in poultry for its growth promoting and immunomodulatory effects.



# Dietary Supplementation of *Lactobacillus*-Based Probiotic Help to Alleviate the Effects of Heat Stress in Broilers

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## ABSTRACT

Heat stress alters intestinal microflora in birds and predisposes them to various enteric infections by damaging mucosal intestinal barrier. Qualitative changes have been observed in histochemistry of mucin in goblet cells during infections. Mucous layer produced by goblet cells prevents gut pathogens from invading the mucosa. *Lactobacillus*-based-probiotics (LBP) and prebiotics are known to enhance this function by increasing goblet cell number. Present study evaluates the effect of LBP and mannanoligosaccharide (MOS) on histochemistry of mucin in goblet cells during cyclic heat stress in broilers.

Day-old broilers (n = 200) were randomly divided into 4 groups. Fifty broilers were reared under standard management conditions (non heat stress; NHS group). Rest of them were subjected to cyclic heat stress from day 21 up to 42 (35°C, 75% relative humidity, 8hours/day, 1000-1800hr). All the groups were fed a corn-soya-based basal diet. Fifty each out of the stressed birds were fed basal diet supplemented with 0.5% MOS (HS+MOS group) and 0.1% LBP, respectively. At 42<sup>nd</sup> day, 12 birds per group were slaughtered. Two centimeter long piece from mid-duodenum was taken from all the groups, fixed and paraffin blocked. After dewaxing, rehydration and sectioning (3µm), the sections were stained with combined alcian blue-PAS technique for acid and neutral mucins producing goblet cells. The goblet cells were counted in 5 villi/section. The cell count was subjected to general linear model (1-way ANOVA). The plan of the study was approved by the university board of advanced studies.

Number of goblet cells containing acid and neutral mucin respectively, were lower (P<0.05) in NHS compared to other three groups. Heat stress triggers the activity of acid and neutral mucin producing goblet cells in broilers. Mannanoligosaccharide and LBP, as a protective mechanism, maintain this triggered activity despite negatively influencing the growth of entero-pathogens in heat stressed broilers.

# Effect of Lactic Acid Bacteria Probiotics and Antibiotic on Broiler Performance

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## ABSTRACT

The aim of this study was to investigate the effect of the use of indigenous lactic acid bacteria probiotics and zinc bacitracin antibiotic to improve productivity performance in broilers. Ninety broiler chicks were assigned randomly into six treatment groups, three replications of five birds each. Chicks in Group 1 were fed basal diet only (T1), Group 2 was fed basal diet + 55 mg zinc bacitracin antibiotic/kg feed (T2), Group 3 was fed basal diet supplemented *Lactobacillus murinus* Ar3 (T3), Group 4 was fed basal diet supplemented *Streptococcus thermophilus* Kp2 (T4), Group 5 was fed basal diet supplemented *Pediococcus acidilactici* Kd6, and Group 6 was fed basal diet supplemented the mixture of all strains of those lactic acid bacteria probiotics. The feed and drinking water were provided *ad libitum* during experiment (28 days). Probiotics supplemented orally 10<sup>8</sup> CFU/ml/bird/day. The broiler basal diet was formulated to exceed the NRC recommendations. The data were analyzed by one way ANOVA of Completely Randomized Design (CRD) and followed by Duncan New Multiple Range Test (DMRT).

The results showed that cumulative feed consumption of broilers during 28 days of experimental period were not different among treatments, that were 2920.72, 3033.37, 2887.35, 3049.44, 3012.39, and 2847.61 (g/bird) for the T1, T2, T3, T4, T5, and T6 groups respectively. However the average of cumulative gain weight (g/bird) between T1 as the control group and the other groups (T2, T3, T4, T5, and T6) were significantly different (P< 0.05). The cumulative gain weight of the experimental groups were 1432.33 (T1), 1613.33 (T2), 1582.00 (T3), 1568.33 (T4), 1547.33 (T5), and 1592.33 (T6) respectively. Feed to gain ratios of all experiment groups (T2 = 1.86, T3 = 1.83, T4 = 1.94, T5 = 1.95 and T6 = 1.79 respectively) improved significantly (P< 0.05) compared to the control (T1 = 2.04).

The conclusion of this study was indigenous lactic acid bacteria probiotics have shown potential as an efficient replacement for antibiotic growth promoters (AGPs) to improve live performance of broiler chickens to produce save food.

**Keywords :** Indigenous lactic acid bacteria probiotic, antibiotic, broiler chicken.



# Antibacterial Activity of Kenikir (*Tagetes patula* L.) Leaf Extracts Against Pathogenic Bacteria and Lactic Acid Bacteria Isolated From Broiler Chickens

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## ABSTRACT

Imbalance microbiota between beneficial bacteria with harmful bacteria (dysbiosis) caused decline in livestock production. The balance of microbiota in gastrointestinal tract can be modified by antibiotics treatment. However, antibiotics treatment for long periods will cause resistance to pathogenic bacteria. One effort to replace antibiotic treatment was application of phytobiotics as feed additive. Anti-microbial activity of kenikir (*Tagetes patula* L.) has been widely reported. Objective of this study was to evaluate the effect of kenikir leaf extract (*Tagetes patula* L.) (KLE) to the growth response of pathogenic bacteria and lactic acid bacteria (LAB) isolated from broiler chickens. Pathogenic bacteria were *Escherichia coli* FNCC 0091 (EC), *Pseudomonas aeruginosa* (PA) and *Salmonella pullorum* (SP), while LAB were *Lactobacillus plantarum* ATCC 8014 (LP), *Lactobacillus salivarius* I72 (LS) and *Leuconostoc lactis* P01 (LL). Anti-microbial activity tests were carried out using broth dilution bioassay methods arranged on Factorial Complete Randomized Design. The test parameters cell colony density/optical density (OD) were measured using spectrophotometer at  $\lambda$  700 nm with observation times at 0, 6, 12, 18 and 24 hours. KLE concentration levels of 0.0, 0.1, 0.2, 0.3, 0.4 and 0.5% (w/v) were added into NB medium for pathogenic bacteria and MRSB medium for LAB. Data were analyzed using analysis of variance (ANOVA) followed by T test. Results showed that addition of KLE into medium reduced not only the pathogenic bacteria growth but also LAB growth significantly ( $p < 0.05$ ). Addition of KLE into medium at 0.1% indicated that no effect to all bacteria, however, at 0.2% KLE or more inhibited the growth, either pathogenic or lactic acid bacteria significantly. KLE was not recommended as a feed additive because its negative effect on LAB which beneficial for livestock.

**Keywords:** kenikir leaf extract, pathogenic bacteria, lactic acid bacteria, feed additives

# The Guidelines of LAB Probiotics to Use for Farm Animals

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## ABSTRACT

Probiotics are preparations of live cultures that, when applied to human and animals, beneficially affect the host by improving intestinal microbial balance and the digestion. They suppress the growth of pathogens, enhance the metabolism and stimulate the immunity. Hence, probiotics are increasingly used in the therapeutic and preventive measures in human and veterinary medicine. The range of foods incorporating probiotics has been extended from dairy foods to infant formulae, fruit juice based foods and cereal based products.

The use of probiotic microorganisms in the nutrition of ruminants enhances the metabolic activities and digestive tract, and supports growth through the supply of amilolytic, proteolytic and cellulolytic enzymes and other beneficial substances. Symbiotic microorganisms of probiotic strains suppress the formation of toxic compounds ( $\text{NH}_3$ ,  $\text{NH}_4$ ,  $\text{CO}_2$ ) in the digestive tract of the host or neutralize their toxicity. Rumen fermentation can be influenced by the use of lactic acid bacteria in silage production.

Probiotic strains of lactic acid bacteria with the ability of suppressing the levels of bacterial enzymes have been widely used in the therapy and prevention of gastrointestinal diseases and intestinal dysbiosis. Lactic acid bacteria release substances with antibiotic effects (lactolin, bacteriocin, nisin), neutralize the environmental pH, and adhere to the gut wall, thus preventing the reproduction of pathogens in the gut flora. In particular, colonizing of LAB at the gut wall builds a substantial barrier to various toxic substances and prevents them from passing through the gut wall into the blood. The range of bacteria with high antagonist activities includes *Lactobacillus acidophilus*, *Bifidobacteria*, and *Lactococcus lactis* subsp. *Lactis*.

In addition to regulating function in the gastrointestinal biocenosis, probiotics activate the immunity of host organisms. Empirical evidence reveals that the application of probiotics in animals resulted in increased number of T-lymphocytes, enhanced activity of B-lymphocyte, and intensified neutrophilic phagocytosis. Pathohistomorphological examination shows increased activities of duodenum lysozyme and membrane of the large intestine as well as stabilization of their forms, increased blood dispersion and enzymic activities. Probiotics do not only support the growth of young animals, but also decrease the risk of illness.

In most common forms of probiotics, the growth substrate is integrated. However, pure bacteria in freeze dried form are also available as tablets, capsules, powder and sachets. The growth substrate predominantly consists of flour from



corn, fish or other forms of flour while milk powder and sucrose are used for preparations of pure bacteria.

Through their valuable bioactive substances such as amino acids, vitamins, ferments and various pharmacologic activities, probiotics offer substantial benefits and opportunities for animal production such as growth intensification, productivity increase, prevention of recurrence of diseases, correction in the therapy against microbes, post-stress regulation, as well as therapy and prevention of metabolic distraction (avitaminosis, anemia etc.), disbacteriosis and gastrointestinal diseases.

Based on the tradition of using fermented milk for centuries and motivated by recent trends and results of research, the Mongolian proiotics research group has been able to develop probiotics 'Lactobacterin STH-1', 'Lactobacterin STH-2', 'Lactobacterin STH-3', 'Lactobacterin STU' and 'Cellulolyt' for veterinary medicine and dietary supplementation in human nutrition using indigenous strains of lactic acid bacteria, and introduced them to the industry.

In today's world of increasing awareness of negative impacts of chemical supplements and antibiotics in food on the human health both in the scientific community and in the public the application of probiotics in veterinary medicine and animal production offers a substantial opportunity for ensuring balanced and healthy nutrition.

Isolation and Identification of Lactic Acid Bacteria and *Saccharomyces cerevisiae* from Natural Sources as Feed-silage Inoculants

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ABSTRACT

This research was conducted to evaluate the isolates of lactic acid bacteria (LAB) and *Saccharomyces cerevisiae* (Sc) from natural sources as silage inoculants. The experiment consisted of 1) isolation and identification of LAB and *S. cerevisiae*, 2) combination test for LAB+Sc growth, and 3) evaluation of the isolates as silage inoculants. The first screening of LAB and Sc had been evaluated by lactic acid production. LAB were identified by morphological, Gram staining, catalase and biochemical test using API CHL 50 biomereux® and Sc was also identified by morphological characteristic, catalase and biochemical test using *Phenol Red Lactose Broth* (PRLB). Combination test of LAB and Sc was arranged on Completely Randomly Design with 2 factors of treatment that were Lp and Sc combination consisted of 100% LAB, 75%LAB+25% Sc, 50% LAB + 50% Sc, 25% LAB+75% Sc, and 100% Sc. Each treatment was incubated with and without CO<sub>2</sub> infusion. The selected combination of Lp+Sc was tested against *Clostridia* inhibition. Results showed that 4 isolates of LAB from maize i.e. SB 121, SB 122, SB 123 and SB 124 produced lactic acid 21.8%, 22.7%, 22.8% and 21.9% respectively, then 3 isolates of yeast i.e. SY 122, SY 123 and SY 132 produced lactic acid 0.45%, 0.45% and 0.90% respectively. The screened LAB (SB 123) had been identified as *Lactobacillus plantarum* and yeast (SY 132) had been indentified as *S. cerevisiae*. Combination of 75% Lp and 25% Sc produced lactic acid (18.9%) during 36 hours incubation and reduced the growth of *Clostridia* similar with control. In summary, Lp or combination of Lp+Sc could be used as silage inoculants. This research will be followed by evaluation of inoculants of Lp and Sc for improving silage quality.

Keywords: Inoculants, Lactic acid bacteria, *S. cerevisiae*, Silage



# Bacterial Lactic Acid Production of Biomass Feedstocks

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Lactic acid (LA) is a versatile chemical, utilized as an acidulant, flavor and preservative in the food, pharmaceutical, leather and textile industries, for the production of base chemicals, and for polymerization to biodegradable poly LA (PLA). About 90% by LA produced worldwide are made by bacterial fermentation and the rest is produced synthetically by the hydrolysis of lactonitrile. Almost all of LA used in Indonesia are imported.

Fermentative production of LA by a strain of LAB has the advantage since LAB produce an optically pure product, whereas synthetic production always results in a racemic mixture of LA. Renewable substrates such as starch, cellulose and hemicellulose are important feedstocks. Fermentative LA production from renewable resources includes the following steps: pretreatment of substrate including hydrolysis to sugars, fermentation of sugars to LA, and purification of LA. LAB ferment sugars via different pathways resulting in homo- or heterofermentation.

Assessment of microbial LA production revealed that sago and cassava starch are technologically feasible. Economic feasibility of industrial LA production in Indonesia are in progress.

# Effect of Dietary Pellet Containing of Lactic Acid Bacteria to The Microbial Performance of The Intestine of Broiler Chicks

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## ABSTRACT

Experiment aimed to evaluate effect of dietary fed which is enriched with Lactic Acids Bacteria (LABs) has conducted at the laboratory of Feed Technology, Fac. Of Animal Science Diponegoro University. The pellet are composes by corn meal, corn straw, rice bran, soybean cake, coconut cake, molasses, cassava starch, and mineral mix, that are formulated to reach 2950 kcal/kg of ME, 19 % of CP and 6,5% of CF. Experiment were conducted with Completely Randomized Design (CRD) by 4 treatments and 3 replications. That are fed a control ration, fed of pellet-LABs at 3 days old of chick, fed of pellet-LABs at 10 days old of chick, and of pellet-LABs at 3 days and it is repeated at 12 days old of chick, and all of chickens are reared with a commercial rations up to 21 days of age. Chickens are decapitated by cervical dislocations, Total LABs, Coliform and *Salmonella* sp. of digesta of intestine are parameter observed. Data were statistically analyzed by GLM of SAS. Results of experiment showed that method feeding rations containing LABs significantly affected microbial performance of broiler's intestine ( $P < 0,05$ ). Performance of LABs, Coliform and *Salmonella* sp. were affected by the method of feeding. Feeding pellet with LABs significantly increased the total number of LABs and suppressed the number of *Salmonella* sp. and Coliform in both of the digesta of the small and large intestines.

**Keywords:** pellet, lactic acid bacteria, feeding method, intestine, microflora



The Growth of *Lactobacillus salivarius* Isolated from Quail Intestine in Soybean Meal Medium

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ABSTRACT

The objectives of this research were to know the effect of pH variation of soybean meal medium on the growth and lactic acid production of *Lactobacillus salivarius* from Japanese quail intestine. A randomized block design was used to assign three variation of pH (5, 6 and 7) of 3 % soybean meal medium. The results showed that the highest cell number was at pH 6 for 24 hours incubation was  $2.8 \times 10^{11}$  CFU/ml and the lowest growth was at pH 5 for 24 incubation hours was  $2.88 \times 10^{10}$  CFU/ml. The number of total acid concentration after fermented 30 hours was 0.51 - 0.59 % and the highest were at pH 6. In conclusion, the optimum growth of *Lactobacillus salivarius* obtained in 3 % soybean meal medium at pH 6.

**Keywords:** *Lactobacillus salivarius*, pH, quail, soybean meal.

The Growth of *Lactobacillus Salivarius* Isolated from Quail Intestine in Rice Bran Medium

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ABSTRACT

This study was conducted to ascertain the effect of medium variation of soybean meal on the growth of *Lactobacillus salivarius* isolated from Japanese quail intestine and lactic acid concentrations. A randomized block design was used to assign three variation of rice bran medium (6, 9 and 12) %. The result showed that the highest cell number was in 9 % rice bran medium at pH 4.7 at 12<sup>th</sup> hour was  $5.2 \times 10^{10}$  CFU/ml. The highest lactic acid concentrations were 0.57 % and the fastest speed of growth in rice bran medium 9 % was 0.92 generation/hour and generation time 45 minutes. In conclusion, the optimum growth of *Lactobacillus salivarius* was in rice bran medium 9 % at 12<sup>th</sup> hour.

**Keywords:** *Lactobacillus salivarius*, growth, quail, rice bran.



Identification of Lactic Acid Bacteria from Quail (*Coturnix japonica*) Tractus Digestivus and Their Potency to Inhibit Growth of *Salmonella typhimurium*

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ABSTRACT

Lactic Acid Bacteria (LAB) is a kind of bacteria able to maintain the balance of microflora in tractus digestivus, has potency as probiotic and able to produce antibacterial agent which inhibit the growth of pathogenic bacteria. This research was carried out in order to identify LAB from quail's tractus digestivus, to observe the potency as probiotic and growth inhibition of antibacterial agent produce by LAB isolates towards *Salmonella typhimurium*.

Research steps done were identification, characterization, assay the potency as probiotic and determination of growth inhibition resulted by cell free supernatant (CFS) of LAB against *Salmonella typhimurium*. Identification was done using API test kit (API 50 CHL) and characterization was carried out by Gram's staining and katalase assay. Potency as probiotic was assayed on MRS broth adjusted to pH 4, 5 and 6 with addition of 0.3% and 1% bile salts, respectively. Detection of antibacterial agent to inhibit *Salmonella typhimurium* was done using 10% to 40% addition of CFS from isolated LAB to the growth medium of *Salmonella typhimurium*.

Two isolates of LAB were obtained from quail's tractus digestivus, using API 50 CHL those isolates were identified as *Lactobacillus salivarius* (99.6%) and *Lactobacillus fermentum* (97.8%). Both isolates have potency as probiotic showed by their viability at pH 5 with concentration of bile salts of 0.3% and 1%. Furthermore, antibacterial agent produced by CFS of *L. salivarius* and *L. fermentum* were able to inhibit the growth of *Salmonella typhimurium* 62.3% and 70.6%, respectively.

**Keywords :** lactic acid bacteria, quail, probiotic, antibacterial agent

Development of Indonesian Indigenous *Lactobacilli* as Probiotic for Diarrheagenic *Escherichia coli*

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ABSTRACT

Rapid growth of pathogens associated with foods and water supplies, particularly those provided in a poor sanitation and hygienic conditions, often causing several health related problems. Diarrhea is one of the common health problem in developing countries. In addition, WHO have been noted that about 17 millions travelers, who visited developing countries in south East Asia, often got diarrhea. This suggests that diarrheagenic pathogens, if present and contaminated foods or water supplies, are critical issues, which seriously can affect the image of Bali and Indonesia as an International tourist destination. Antibiotic is commonly an option in combating pathogens, nevertheless this choice often pronounced resulted in multi drug resistance strain. Studies focused on application of endogenous non-pathogenic bacteria particularly lactic acid bacteria (lactobacilli and bifidobacteria) to combat diarrheagenic pathogens especially, *E. coli*. Numerous researches have been conducted aiming to provide scientific platforms. From those efforts, a strain of *Lactobacillus* sp. has been selected based upon its capabilities to resist under gastrointestinal conditions as well as its functional properties on *in vitro* studies. This strain is promising to be developed as novel probiotic from Indonesian bio-diversity.

**Keyword:** probiotic, diarrhea, *Escherichia coli*



Production of Short Chain Fatty Acid (SCFA) of *Sprague Dawley* Rats Feeding with Sorbitol Oleic Polyester (SOPE) for Fat Substitute in Diet

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ABSTRACT

The study on effect of SOPE in fat substitution has been conducted for diet of *Sprague Dawley* rats. The group consisted of 10 rats were fed with SOPE (0, 25, 50, 75, and 100%) for 28 days. The quantitative of microbial in feces were observed every week by VRBGA (???) and PGY + CaCO<sub>3</sub> medium. In the end of study, SCFA of the digesta were also measured. The SCFA of the digesta was decreased in accordance to increase of SOPE concentration, but ratio of acetic, propionic, and butyric acid was found stable. SOPE intake did not affect the colon healthy of rat.

**Keywords:** SOPE, feces, digesta, SCFA

Effect of Soygurt Supplemented by *Lactobacillus casei* subsp *rhamnosus* on Digesta Profile in Mice

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ABSTRACT

*Lactobacillus casei* subsp *rhamnosus* FNCC 0052 was considered to have probiotic activity for human intestinal health. This strain was further investigated for its activity in soygurt substrate regarding its role to maintain the composition of intestinal microflora in mice (*Mus musculus*). The objective of this research was to determine the effects of oral administration of soygurt supplemented by *L. casei* subsp *rhamnosus* FNCC 0052 on digesta profile in mice. Mice were fed with stock diet and drinking non-supplemented soygurt and soygurt supplemented by *L. casei* subsp *rhamnosus* for 21 days as treatment groups, while as control group was mice without administration of soygurt at all. The result showed that oral administration of soygurt supplemented by *L. casei* subsp *rhamnosus* significantly increased ( $P < 0,05$ ) the fecal populations of lactic acid bacteria (LAB), while it significantly inhibited ( $P < 0,05$ ) those of *Eschericia coli*. The highest production of butyric acid as short chain fatty acids occurred in the caecum digesta of mice administrated by soygurt supplemented by *L. casei* subsp *rhamnosus*, however its acetic and propionic acid production were not significant different ( $P > 0,05$ ) compared with control mice group.

**Keywords:** soygurt, *Lactobacillus casei* subsp *rhamnosus* FNCC 0052, digesta profile.