

Evaluation of Indigenous Probiotic Isolate From Rice Bran *L. plantarum* B2 and Commercial Isolate *L. casei* in Fermented Rice Bran Media Using *In Vivo* Methode

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ABSTRACT

The development of food science and people awareness of the importance of health has increased people's attention to functional foods. One of these functional foods is probiotic food that has beneficial effect on human intestinal tract. Recently, many study on cereal based fermented food probiotic has been developed since they have synbiotic effect which is combination of probiotic and prebiotic.

Ricebran which is rich in nutrition such as oryzanol, tocopherol and ferulic acid that made it as a potential raw material for functional food. It is also a potential source of Lactic Acid Bacteria (LAB). From previous study, 9 (nine) strains were isolated from rice bran from various rice mill in Malang. The *in vitro* experiment indicated that *Lactobacillus plantarum* B2 from previous study has probiotic effect and high viability. In this study, of probiotic isolates were carried out using *in vitro* method.

The aims of this research are to compare the viability of indigenous LAB *L. plantarum* B2 and commercial isolate *L. casei* inside the intestinal tract and to observe the inhibitory effect on pathogenic microorganisms such as *E. coli* and *Salmonella* by using *in vivo* method.

Complete Block Design was used with single factor which is added feed in four levels and was done with three replications. The levels are fermented rice bran media with no isolate (Formula I), with commercial isolate *L. casei* (Formula II), with indigenous isolate *L. plantarum* B2 (Formula III) and control (standard feed). The data retained from the research are than analyzed by descriptive analysis. The best treatment searched by "Ranking" method.

The result indicates that the feeding of fermented rice bran for 20 days can increase total amount of LAB, inhibit pathogenic growth and decrease the pH of mice feces. The best treatment is Formula III which used indigenous isolate *L. plantarum* B2. Data results from best treatment are total bacteria $8,60 \times 10^{10}$, total LAB $5,80 \times 10^7$ CFU/g, total pathogenic *E. coli* $3,00 \times 10^4$ CFU/g and total *Salmonella* $1,67 \times 10^4$ CFU/g and pH 6,47.

Keywords: Probiotic, *L. plantarum* B2, *L. casei*, rice bran, *in vivo*

Potency of Lactic Acid Bacteria Isolated From Breast Milk to Prevent Diarrhea Caused By Infection of Epec K1.1

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ABSTRACT

Some of *Lactobacillus* species isolated from breast milk are known to have anti-microbial activities, including against *E. coli*. The aims of this study were to evaluate the antimicrobial activity of *Lactobacillus* species isolated from breast milk against enteropathogenic *E. coli* strain K1.1 (EPEC K1.1) and the effectiveness of *Lactobacillus* isolates to prevent period of diarrhea on rats (Sprague Dawley). The present study was conducted in three stages. The first stage was evaluating the antimicrobial activity of *Lactobacillus* isolates against EPEC K1.1. The second stage was evaluating infective dose of EPEC K1.1 to induce diarrhea without causing death of the rats. The third stage was evaluating of effectiveness to prevent diarrhea or to shorten the period of diarrhea on rats. During the third stage, number of rats with diarrhea were monitored daily. Analyses were also done on the total *E. coli* and total lactobacilli in feces of rats. At the end of the experiment, the total *E. coli* and total lactobacilli were also analysed in cecum and colon. Based on antimicrobial activity there were three isolates of *Lactobacillus* with good inhibition against EPEC K1.1, they were *L. rhamnosus* R14, *L. rhamnosus* R23, and *L. rhamnosus* B16. The determination of EPEC dose shows that 10^8 cfu of EPEC K1.1 was sufficient to induce diarrhea on rat without causing death. The numbers of diarrhea rats and severity level in group treated with *Lactobacillus* were lower than the numbers of untreated rats (infected by EPEC K1.1). Based on this study it was concluded that the three *Lactobacillus* isolated from breast milk were able to prevent diarrhea due to infection of EPEC K1.1. when the lactic acid bacteria was regularly introduced prior to infection. *Lactobacillus rhamnosus* R23 showed the best capabilities of preventing diarrhea in rats compared to two other isolates of *Lactobacillus*. The incidence of diarrhea correlated with the number of lactobacilli in the feces. However when the period of diarrhea cured, there were no difference in total lactobacilli and *E. coli* in cecum, colon and feces between rats treated with lactobacilli and the control. The results also show that when the introduction of lactic acid bacteria was done at the same time with the infection of *E. coli*, the lactic acid bacteria could not prevent the incidence of diarrhea.

Keywords: breast milk, diarrhea, *Lactobacillus*, EPEC, antimicrobial

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.

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Gastro Intestinal microbiota exert many important functions for the gut and the immune- system. Especially the production of short chain fatty acids (SCFAS) from fibers has a considerable importance for colonic health. Among SCFAS butyrate is known to have a strong anti-inflammatory potential as a consequence of epigenetic effects.

We compared butyryl-CoA CoA transferase gene abundances with a 16S rRNA gene quantification of bacteria, *Clostridium* cluster IV & XIVA in order to assess the butyrate production capacities in human microbiota samples.

Faecal samples of young healthy omnivores (3.4), vegetarians (n=15, age: 26 ± 5 yrs/μ(n=15, age: 24 ± 2.5 yrs/BMI 22.68 5.08) were BMI 21.02 ± 2.71) and elderly (n=15, age: 86 ± 8 yrs / BMI 21.75 analysed in quantitative PCR (qPCR). Diet and lifestyle was assessed in questionnaire-based interviews. Elderly had significantly less copies of the butyryl-CoA CoA-transferase gene than omnivores (p=0.014) and vegetarians (p=0.048). The butyrate gene variant related to *Roseburia/E.rectale* spp. was significantly more variable in vegetarians than in elderly. At the same time the *Clostridium* cluster XIVA was more abundant in vegetarians (p=0.049) and omnivores (p=0.0018).

Our results indicate that vegetarian as well as omnivore diet have similar potentials to shape a healthy microbiota. The elderly microbiota was characterized by low butyrate production capacity, possibly contributing to the development of degenerative diseases and anorexia in advanced age.

The Production of Soya-Yoghurt Powder by Spray Drying

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ABSTRACT

The general objective of this research was to study the process of making soya-yoghurt powder. While the particular aim was (1) to study the soymilk extraction process (hot and cold) on powder characteristics of soya-yoghurt, (2) to know the chemical characteristics of soymilk and soymilk residue (hot and cold extraction), (3) to know the characteristics of chemical and microbiological soya-yoghurt, and (4) to study the viability of LAB in soymilk powder fermented after spray drying. Soymilk was produced by three different ratio of soybean : water (1:8, 1:6 and 1:5), extracted by hot and cold method, applied to fermentate soy milk by two strain *S. thermophilus* and *L. bulgaricus*. Soya yogurt was then drying to obtain powder. Analysis was performed for the proximate analysis of soymilk, soya-dregs, soya-yoghurt and soya-yoghurt product. The observation of pH in soya-yoghurt, total solids in soymilk and soya-yoghurt, the number of microorganisms on soya-yoghurt and soya-yoghurt powder, and sensory testing of soya-yoghurt powder were also conducted in this research. Results showed that hot and cold extraction soya-yoghurt on the pH and the number of LAB did not appear different on microbiological testing, soya-yoghurt produced had a total LAB 1.69 x 10⁸ CFU/ml dan 1.58 x 10⁸ CFU/ml, pH 3.86 and 4.11 for hot and cold extraction. Spray drying caused a three log cycles decreased in the number of living cells. Soya-yoghurt powder product had a total LAB 1.02 x 10⁶ and 1.51 x 10⁶ CFU/g. From the results of sensory evaluation were obtained by hot extraction soya-yoghurt powder were preferred by the panelists due to reduction of beany flavor, but in terms of color was less favored since the forming of blackish-brown color.

Keywords : soybean, soymilk, *S. Thermophilus*, *L. bulgaricus*, soya yogurt powder

maltodextrin addition

Study of the Production of Yogurt Powder by Spray Drying

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ABSTRACT

This research aims to produce yogurt powder with fresh milk and skim milk as raw materials which contain *Lactobacillus bulgaricus* FNCC 0040 and *Streptococcus thermophilus* FNCC 0041 with high viability using spray drying method. Yogurt is made by using 10% (w/v) of fresh milk and skim milk and 2% (w/v) of sugar as addition. And then, it is pasteurized at the temperature of 80°C for 30 minutes. The temperature used for incubation is at 43°C for 6 - 8 hours. Composition of the starter mixture by using a basis of comparison *S. thermophilus* (FNCC 0041) and *L. bulgaricus* (FNCC 0040) is 1 : 1. After the fermentation is complete, it's stored at low temperature of 4°C for a night and performed drying with spray drying. Yogurt powder is obtained by spray drying using protective material maltodextrin with a ratio of solids yogurt : maltodextrin (1:2). The research shows that the percentage of total solid loss during spray drying process on fresh milk yogurt as much as 37,90 - 67,88% and 30,64 - 52,33% on skim milk yogurt. Protein concentration averages (% db) on fresh milk plain yogurt, skim milk plain yogurt, fresh milk yogurt powder, and skim milk yogurt powder successively are 19,61%; 21,77%; 11,08%; 10,24%. Fat concentration averages (%db) successively are 28,11%; 8,60%; 5,29%; 0,93%. Ash concentration averages (% db) successively are 5,04%; 6,54%; 2,80%; 2,44%. Carbohydrate concentration averages by different (%db) successively are 47,24%; 63,00%; 80,84%; 86,39%. The drying with spray drying method has caused a decline in the number of cells of *S. thermophilus* (FNCC 0041) and *L. bulgaricus* (FNCC 0040) amount to 5 log cycles on fresh milk yogurt and 4 log cycles on skim milk yogurt. Preference value of panelist on plain yogurt and powder yogurt to the parameters of appearance and color, consistency, homogeneity, aroma, and flavor ranges from 2,75 to 3, 85 (fairly like to like).

Keywords : spray drying, *L. bulgaricus*, *S. thermophilus*.

Quality of Yoghurt Cow Milk Various Percentage of Addition of Starter (*Streptococcus thermophilus* and *Lactobacillus bulgaricus*)

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ABSTRACT

Yoghurt is one of technological result processing of milk having value of nutritious.very good and high consumed for patient of intolerance lactose. Making of yoghurt highly varied but the target of him to eliminate bacterium of patogen and lessen rate irrigate and also process the processing of having to hiegenis so that obtained good product with quality. this Research target to know quality of yoghurt at various gift of percentage of starter differ. Device the used is Complete Random Device of single factor by 5 treatment that is: A1= Starter of *Streptococcus thermophilus* (ST) and of *Lactobacillus bulgaricus* (LB)= (1:1), A2= (ST:LB)=(1/2:1), A3= (ST:LB)=(1:1 / 2), A4=(ST:LB)=(1:0) and A5=(ST:LB)= (0:1) by 3 replication. Parameter perceived to cover, acid contents of lactat, test and pH of organoleptic (feel, flavour, and colour of tecstur). Result of research indicate that comparison of starter of *Streptococcus thermophilus* (ST) and of *Lactobacillus bulgaricus* (LB)=(1:1) yield yoghurt with and acidity of pH the goodness and also feel, flavour, and colour of tecstur took a fancy to panelist while comparison (ST:LB)= (1:1/2) yielding yoghurt with acid contents of lactat compared to higher of other treatment, is so that suggested at making of cow milk yoghurt with comparison (ST:LB) = (1:1) counted 3%, because obtained by and acidity of pH best and also quality of organoleptic took a fancy to panelist.

Keywords: percentage of starter, quality of yoghurt, cow milk.

The Use of Carrageenan as A Stabilizer in The Fermentation of Peanut Milk Drink by *Lactobacillus acidophilus* SNP-2

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ABSTRACT

The effect of various concentration of carrageenan on the physical stability of fermented peanut milk drink suspension was evaluated. Starter culture of *Lactobacillus acidophilus* SNP-2 (currently identified as *L. paracasei* SNP2) was inoculated into peanut milk containing 0.1-0.3% carrageenan, incubated at 37°C 18 h, and then kept at 4°C for 28 days. The result showed that addition of 0.1-0.3% carrageenan on the peanut milk did not give any significant effect on the growth of *L. acidophilus* SNP-2, and the production of acid. At the end of fermentation time the number of bacterial cell, titratable acidity, and pH were in range 2.2×10^8 - 5.4×10^8 CFU/mL, 0.38 - 0.41% and 3.36 - 3.64 respectively. The number of viable cell relatively constant during storage at 4°C. Titratable acidity continued to increase during cold storage indicated the metabolism of *L. acidophilus* SNP-2 at 4°C. Stability index of fermented peanut milk drink with and without addition of carrageenan were relatively similar (0.76-0.83). However during storage at 4°C, stability index of fermented peanut milk drink without addition of carrageenan decreased to 0.45. Addition 0.3% carrageenan improved the suspension stability of fermented peanut milk drink with the stability index of 0.63.

Keywords: peanut milk, fermentation, *Lactobacillus acidophilus* SNP-2, carrageenan

For low pH → pectin

The Effect of Sugar on Chemical and Sensoris Properties of *Kerandang* (*Canavalia virosa*) Yogurt

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ABSTRACT

Kerandang (*Canavalia virosa*) is a kind of local nuts, usually grown on the coastal areas. Protein content of *kerandang* is almost the same as soybean about 30%. Today, the utilization of *kerandang* not been optimal. The objective of this study was to know the effect of sugar (sucrose, fructose, glucose and its mixing) on chemical and sensoris properties of *kerandang* yogurt. The studies of chemical and sensoris properties of *kerandang* yogurt was conducted in AIAT Yogyakarta on July-October 2010. The yogurt was made using indigenous lactic acid bacteria. The examination was conducted using completely randomized design with three replications and six treatment was adding some type of sugar, including (1) glucose, (2) sucrose, (3) fructose, (4) 50% glucose + 50% sucrose, (5) 50% glucose + 50% fructose, and (6) 50% sucrose + 50% fructose. *Kerandang* yogurt were analyzed, involved sensoris evaluation with hedonic method; pH; water; fat; protein; lactic acid; total sugar; HCN and total bacteria content (TPC). The result shown that overall, the panelist accepted *kerandang* yogurt. Total sugars, fats, and TPC significantly different in each treatment. Total sugar content of *kerandang* yogurt with glucose addition is highest (9,61%) than the other treatment. Fat content of *kerandang* yogurt with the addition of 50% sucrose + 50% glucose is highest (0,06%) and TPC of *kerandang* yogurt is the highest generated by the addition of 100% fructose (2.450×10^8 CFU/g).

Keywords : *Kerandang*, yogurt, sugar, chemical and sensoris properties

Effects of Tempeh's Types, Blanching and Skim Addition on Consumer Acceptance of Nuts Tempeh Yoghurt

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ABSTRACT

Research on the effect of tempeh, blanching and addition of skim milk to the consumer acceptance of yogurt tempeh nuts conducted in the Laboratory of Postharvest and Agricultural Machinery, Agricultural Technology Assessment Institute in Yogyakarta in September - November 2010. This research using completely randomized design with three factors. The first factor is the kind of tempeh (soy, koro, and benguk), the second was treated with blanching and not, and the third factor is the addition of skim milk at 5% and no addition (0%). The results showed that consumers most like yogurt tempeh from the lentils with blanching treatment for 10 minutes and the addition of 5% skim milk. With this treatment fungus was not detected in the product. Population of yeast in extract koro tempeh is 4.05×10^4 CFU/gram, while in tempeh yogurt the population of yeast is 2.25×10^7 CFU/gram and lactic acid bacteria is 1.11×10^7 CFU/gram. pH of extract koro tempe decreased from 7 to 4 after yogurt was produced. Value and percentage of overall consumer acceptance of this treatment was 3.44 and 77.78%.

Keywords: types of tempeh, blanching, skim milk, consumer acceptance, tempeh yogurt.

The Characteristics and Sensory Evaluation of Functional Food Based on Cassava

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ABSTRACT

Research on characteristic and sensory evaluation of functional foods made from cassava was conducted at Laboratory of Post-Harvest and Agricultural Machinery Assessment Institute for Agricultural Technology in Yogyakarta. This study aims to determine characteristics of tape cassava, total amount of lactic acid bacteria (LAB), total lactic acid, pH and sensory evaluation. Sensory test using preference tests include color, odor, taste and overall preference. In this research, tape was made from cassava with the addition of *Pediococcus acidilactisi* F-11. A tape made from cassava with addition of 1% yeast and *P. acidilactisi* F-11 inoculum in PGY medium of 0%, 1% and 2% subsequently and then incubated at ambient temperature for two days. After incubation tape cassava was analyzed of its total amount of LAB, total acid, pH and sensory evaluation. The result showed that addition of LAB could increase the total amount of LAB in tape cassava until three log cycle. Tape cassava which inoculated with LAB contained total amount of LAB more than 10^7 CFU/gram. This result indicated that tape cassava could be categorized as functional food which called tape probiotic. The sensory evaluation tape cassava is preferred by consumers.

Keywords : tape probiotic, functional food, *P. acidilactisi* F-11

Effect of *Pediococcus acidilactici* F-11 Addition on Antioxidant Activity and Sensory Properties of Probiotic Sweet Potato Ice Cream

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ABSTRACT

Research on probiotic sweet potatoes ice cream has been carried out in Agricultural Machinery and Post Harvest Laboratory, BPTP Yogyakarta. Sweet potato ice cream is known as one of the frozen snack foods that contain antioxidants. This study aims (i) to study the effect of addition probiotic culture *P. acidilactici* F-11 to the antioxidant activity of purple and orange sweet potato ice cream, (ii) to identify the quality of microbiological, chemical, and sensory properties of ice cream produced. Sweet potato ice cream is made with the addition of bacterial culture of *P. acidilactici* F-11 as much as 0, 5%, 10% (v/v), followed by observation of the effect of adding bacterial culture to the antioxidant activity, testing the quality of microbiological, chemical and sensory (color, texture, smell, taste, and overall) probiotics sweet potato ice cream. The results indicated the type of sweet potato and the level of the addition of bacterial culture significantly affected the level of antioxidant activity in sweet potato ice cream. Antioxidant activity is increased by 7.3% - 9.1% at 5% addition of bacteria, while the addition of 10% increased to 18.7% - 28.2%. Total lactic acid bacteria probiotic sweet potatoes ice cream both purple and orange increase by 4 log cycles from the beginning of 6.9×10^3 - 8.1×10^3 CFU/g. The total concentration of acid was significantly different for all types of sweet potato and the addition level of culture between 0.1309% - 0.2931%. Probiotic ice cream of purple sweet potato and the addition of bacterial culture 5% have sensory properties of the most preferred panelists, with the highest preference value of 3.614 and standard admission amounted to 54.50%.

Keywords: ice cream, antioxidant, probiotics, *P. acidilactisi* F-11

Total Count of Lactic Acid Bacteria, Acidity and Total Solid of Banana (*Musa paradisiaca* sp) Enriched Probiotic Ice Cream

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ABSTRACT

This study focused on the total count of Lactic Acid Bacteria (LAB), acidity and the total solid of banana enriched probiotic ice cream. Randomized Completely Block Design (RCBD) was used as an experimental design with five treatments and four replicates of concentration levels for banana enriched into probiotic ice cream. The given concentration levels for banana were 0, 1%, 2%, 3% and 4%. The total count of LAB and the total solid were not affected significantly ($P > 0.05$) while the acidity was affected significantly ($P < 0.05$) by the given concentration levels of banana enriched into probiotic ice cream.

Keywords: LAB, acidity, total solid, ice cream, probiotic

Viability of *Lactobacillus plantarum* 12A2 during Processing of Probiotic Sweet-corn Ice Cream

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ABSTRACT

Lactobacillus plantarum 12A2 is a lactic acid bacteria isolated from siwalan (*Borassus flabelifer* Linn.) palmyra. The isolate has been studied for its viability during processing of probiotic sweet-corn ice cream. A mixture of corn milk, sugar, whipping cream and Na-CMC have been processed for pasteurization, homogenization and aging. The mixture was then inoculated by a 4 % (v/v) of starter of *Lactobacillus plantarum* 12A2, and then incubated at 42°C for different time periods of 0; 2; 4; and 6 hours. The next steps were churning at 5°C for 30 minutes and hardening at -15°C for 24 hours. The results showed that viability of *Lactobacillus plantarum* 12A2 during churning process at different time periods of fermentation was not significantly different. However, viability of the lactic acid bacteria during hardening process at different time period was significantly different. Total of viable lactic acid bacteria in sweet-corn ice cream after hardening process were in a range of 10.4624 and 11.6990 log CFU/ml. Photographs of microscopic observation showed that hardening process have a detrimental effect on the lactic acid bacteria cells, which might be due to ice crystals forming during the process.

Keywords: viability, *Lactobacillus plantarum* 12A2, probiotic ice cream, sweet corn, fermentation, churning, hardening

Tape Ketan Fermentation with the Supplementation of Probiotic Bacteria

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ABSTRACT

Probiotics are live, but non-pathogenic, micro-organisms that are used to alter the microbial balance in the intestinal tract. Probiotics are one of components in functional foods. Awareness of Indonesian community towards the probiotic products is also increasing while the number of probiotic food with bacteria cultures from foreign country is growing. The purpose of this study is to reveal the potential of "tape ketan" fermentation as a functional food. "Tape ketan", which is a traditional food of Indonesia, will be a 'vehicle' for local probiotic (*L. plantarum* Dad 13). Methods to accomplish this goal is fermentation of tape using *ragi* with the supplementation of *L. plantarum* Dad 13 to make *tape ketan* as functional food. The supplementation of *L. plantarum* Dad 13 was 10^{10} CFU/ml into 1 kilogram cooked glutinous rice, so the initial concentration of probiotic bacteria in tape ketan was 10^7 CFU/g. The fermentation of *tape ketan* was carried out in room temperature for a week and the bacteria cells were counted in day 0, 1, 2, 3, 5 and 7. Medium used to grow *Lactobacillus* was Rogosa and MRS was used to grow lactic acid bacteria. The result showed that common *tape ketan* is best consumed in day 2 of fermentation because it gave the best taste based on its ethanol, sugar concentration, and acidity. The average number of lactic acid bacteria in 2nd day fermentation of common *tape ketan* was $6,2 \times 10^7$ CFU/ml and average number of *Lactobacillus* was $6,1 \times 10^7$ CFU/ml. Meanwhile, in 2nd day fermentation of probiotic *tape ketan*, the colony of lactic acid bacteria was $9,1 \times 10^7$ CFU/ml and for *Lactobacillus*, it was 8×10^7 CFU/ml. It showed an increasing number of lactic acid bacteria after the supplementation *L. Plantarum* Dad 13. The colony of *Lactobacillus* species had almost the same number with the colony of lactic acid bacteria. It means that lactic acid bacteria in *tape ketan* had been dominated by *Lactobacillus*, especially by *L. Plantarum* Dad 13 in probiotic-supplemented *tape ketan*. These number of *Lactobacillus* in probiotic *tape ketan* had fulfilled the standard which *tape ketan* is best consumed and has its role as functional food.

Keywords : *tape ketan*, *ragi*, probiotic bacteria, *L. plantarum* Dad 13, supplementation, functional food

The Effect of Lactic Acid Bacteria Starter Cultures on the Quality of Yoghurt and Gastrointestinal Tract Ecosystem in Mice

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ABSTRACT

The purpose of this study was to evaluate yoghurt microbe of *Lactobacillus bulgaricus*, *Streptococcus thermophilus*, *Lactobacillus acidophilus*, *Bifidobacterium* and their mixtures to intestine microflora on mice. The method of manufacture and the composition of the cultures used for the fermentation of the milk vary from area to area. The time of fermentation depends on the temperature, and the percentage and the type of the starter culture. The percentages of starter culture may vary from 0.5 to 5.0%, but usually the lower percentage of starter culture is applied. This trial used a Complete Random Design (RAL) with 4 treatments and each treatment was repeated 4 times; so that there were 16 units and each unit consist of 5 mice and the total number of mice used were 80 units. The results indicated that yoghurt with correct measurement of probiotic mixtures (*Lactobacillus bulgaricus*, *Streptococcus thermophilus*, *Lactobacillus acidophilus*, *Bifidobacterium*) has a good implementation in mice intestine microflora. The concentration of non pathogenic microflora increased in mice intestine, especially for the mice fed with yoghurt containing mixture of *Lactobacillus acidophilus*, and *Bifidobacterium*. They also decreased the population of pathogenic microflora such as *E coli* and *Staphylococcus* in mice gastrointestinal tract.

Keywords : gastro intestinal tract, ecosystem and blood; *Bifidobacterium*, *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, and *Streptococcus thermophilus*

Identification of Lactic Acid Bacteria Strains Expressing Trypsin-Like Activity Using 16s rDNA Sequence

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ABSTRACT

Our research group had isolated several strains of lactic acid bacteria expressing trypsin-like activity (Nurhasanah *et al.*, submitted for publication). Genomic DNA were isolated from these strains, and used as a template for the PCR amplification of the 16s ribosomal DNA. The amplifications were performed using the universal primers, which sequences were slightly modified from those published by Weisburg. The sequence was analysed using the Basic Local Alignment Search Tool (BLAST) facility available at the NCBI website. Nucleotide database was searched by inputting nucleotide query using *blastn* facility.

The Effect of Growth Medium Removal Prior to Transfer to Production Medium towards Medium pH and Trypsin Activity Produced by Lactic Acid Bacteria

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ABSTRACT

In cases of pancreatic disease, trypsin deficiency often occurs due to reduced expression of trypsin in the pancreas (AACC, 2008). Patients with pancreatic problem can be treated with enzyme supplement containing digestive enzyme, including trypsin. However, most of the enzymes currently used for the treatment are derived from porcine and bovine. On the other hand, lactic acid bacteria is also known to show trypsin-like activity. In the previous work, our group screened 40 lactic acid bacteria isolates for protease and trypsin activity and three strains were found to have expressed trypsin-like activity. For trypsin production the three strains were initially grown in MRS (de Mann, Rogosa and Sharpe) medium before transferred directly to the production medium. The production medium was set to pH 6 (the same with MRS medium pH) for the sake of the cell growth. However, most trypsin has an optimum pH of around 8. In this project we altered the pH of the production medium to pH 8, and harvested the cells from MRS culture by centrifugation prior to their inoculation to the production medium. Observation of culture growth and enzyme activity indicated that the new strategy improved enzyme activity whilst not affecting the growth of the culture.

Isolation and Identification Lactic Acid Bacteria from Raw Beef Meat

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ABSTRACT

Eighteen presumptive isolates of lactic acid bacteria, have been isolated and identified from raw beef meat using standard physiological and biochemical test. The result showed that 7 isolates belong to *Lactobacillus fermentum*, 4 belong to *Lactococcus lactis* ssp. *lactis*, 3 belong to *Lactobacillus plantarum*, and 4 belong to *Lactobacillus paracasei* ssp. *paracasei*. These strains obtained were indicated that the presence of heterofermentative *Lactobacillus* species in raw beef meat.

Keywords: lactic acid bacteria, heterofermentative Lactobacillus spp, Lactobacillus fermentum, Lactobacillus lactis spp. lactis, Lactobacillus plantarum, and Lactobacillus paracasei spp. paracasei.

Antibacterial Effect of Spices on Fermented Meat

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ABSTRACT

Garlic and coriander were examined to determine their antibacterial and promotional activity against various bacteria. By paper disk diffusion, was admitted some inhibition of spoilage and pathogenic bacteria. Garlic revealed its antibacterial activity against in order of *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Pseudomonas fragi*. While coriander demonstrated an antibacterial activity against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas fragi* in orderly. Neither spice showed any inhibitory effect against *Lactobacillus plantarum* and *Pediococcus pentosaceus*. In liquid medium, they promoted the growth of both Lactic acid bacteria cultures, but there was activation of the growth of Lactic acid bacteria. The results indicate that the use of garlic and coriander in fermented meat could encourage an optimal fermentation process and depress the presence of spoilage and pathogenic bacteria.

Keywords : Garlic, coriander, *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas fragi*, *Lactobacillus plantarum*, *Pediococcus pentosaceus*

Inhibition Activity of Lactic Acid Bacteria from *Pekasam Puka* on the Growth of Pathogenic BacteriaRita Khairina¹, Edwin Noor Fikri², and Marlina³¹ Faculty of Fishery Lambung Mangkurat University, Banjarbaru² Faculty of Agriculture Lambung Mangkurat University³ Faculty of MIPA Lambung Mangkurat University Banjarbaru

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ABSTRACT

Pekasam Puka is a fermented food product made from bamboo shoots. This fermented food is a traditional food of Dayak Deah communities at Tabalong District of South Kalimantan. The aim of this research is to test antibacterial activity of lactic acid bacteria isolate from *pekasam puka* with bacterial pathogen (*Bacillus subtilis*, *Staphylococcus aureus*, dan *Escherichia coli*). Six isolates of lactic acid bacteria which play role during the fermentation have been isolated and also tested their antibacterial activity against the growth of *Bacillus subtilis*, *Staphylococcus aureus*, and *Escherichia coli*. The results showed that all isolates of lactic acid bacteria had antibacterial activity against all bacteria tested, with a range of inhibition zone 7.75 mm - 10.67 mm.

Keywords: *pekasam puka*, bamboo shoots, fermentation, lactic acid bacteria.

Antimicrobial Activity of Lactic Acid Bacteria Isolated From *Bakasang* Against Pathogenic Bacteria and Spoilage Bacteria

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ABSTRACT

Lactic acid bacteria (LAB) were known to have potency to improve quality and safety of food through natural inhibition against harmful flora that are pathogenic. They also can serve as a food preservative. In the process of fermentation *bakasang*, LAB will produce lactic acid through the process of carbohydrate metabolism that can inhibit the growth other bacteria. In addition to production of lactic acid, LAB is able to produce antimicrobial components such as hydrogen peroxide, diacetyl and bacteriocin. The objectives of the research are to isolate and identify lactic acid bacteria on *bakasang* (fermented Cakalang fish) based on phenotypic characteristics (morphology, physiology and API system) and test the inhibitory activity against pathogenic bacteria and spoilage bacteria by using well-diffusion method. The indicator bacteria used were *Escherichia coli* ATCC 35218 and *Staphylococcus aureus* ATCC 25923, and *Pseudomonas fluorescens* FNCC 0070.

Result of isolation on *bakasang* obtained 200 isolates, of which 125 isolates were considered to be LAB as determined by culturing on MRS agar, Gram stain appearance, catalase test, spore-forming, motility and gas production from glucose. The LAB isolates were characterized further to the genus level and the results showed that 125 isolates LAB were classified into the genus *Lactobacillus*, *Leuconostoc* and *Pediococcus*. In general, LAB inhibitory activity against pathogenic bacteria and spoilage bacteria. Isolates BksC24, BksJ21, BksJ43 and BksK25 have the highest diameter of inhibition zones (15 mm). Based on API system (API 50 CHL), the four isolates of LAB are classified within member of species *Pediococcus pentosaceus*.

Keywords : *Bakasang*, LAB, antimicrobial, phenotypic characteristics, API System

Cultivable Lactic Acid Bacteria Isolated from *Bekasam* (Indonesian fermented fish) and Their Proteolytic and Angiotensin Converting Enzyme Inhibitory Activities

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ABSTRACT

Bekasam, an Indonesian fermented fish is perceived to have antihypertensive activity, which is thought to be the activity of bioactive peptides, the product of proteolytic degradation during the *bekasam* fermentation. We have evaluated the proteolytic strains of lactic acid bacteria isolated from *bekasam* by screening on their growing and giving the clear zone on 2% skim agar. Some 146 strains of the indigenous- *bekasam* lactic acid bacteria, we found that 82 strains showed their proteolytic activity. Among the tested strains, the selected strains were identified belong to species of *Lactobacillus plantarum* B1765, *L. plantarum* T2565, *L. plantarum* N2352, *L. plantarum* B1465, *Lactobacillus pentosus* B2555, and *Pediococcus pentosaceus* B1661 based on the height of the proteolytic and homofermentative fermentation activities and by identification with API CH50 kit. All strains were well cultivable when inoculated on *bekasam* "like product" based on their growth and reduced pH in fermentation process. The growth of all strains increased from 10⁶ CFU/g to 10⁹ CFU/g after 3 or 4 days of fermentation at room temperature and stable relatively until 7 days, the end of fermentation. The pH reduced from 5.93- 6.09 to 4.88 - 4.16. The peptides as a measured of the proteolytic activity increased and varied along the fermentation process for all the strains. The highest increasing peptides (1.30±0.36 to 3.41± 0.02) mg/g was found on *L. plantarum* B765 and the smallest one (1.26±0.25 to 1.77±0.35) mg/g on *P. pentosaceus* B1661. There was a correlation between the inhibitory activities and the increasing of peptides. *L. plantarum* B1765 (68.17±1.32%) was exhibit the highest ACE inhibitor activity, followed by *L. plantarum* T2565 (62.54±2.11%), *L. plantarum* N2352 (61.56±1.32%), *L. plantarum* B1465 (59.85±1.58%), and *L. pentosus* (56.61±4.28%), whereas *P. pentosaceus* (18.66±3.91%) showed the smallest one.

Keywords: *Bekasam*, Fish Fermentation, Indigenous Lactic Acid Bacteria, Proteolytic Activity, ACE inhibitor.

The Quality Improvement of *Rusip* Product
Using Starter Culture of *Pediococcus acidilactici* F-11

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ABSTRACT

Rusip is a traditional fermented fish product originated from Bangka Belitung. The characteristic of *rusip* are consisted of whole fish or a part, tender, bright with grayish-brown liquid, acid flavor, compact, and balance salty and acid taste. *rusip* was spontaneous fermented from anchovies (*Stolephorus* sp) for 7-14 days with salt addition of 10 to 25% (w/w) and 10% (w/w) brown sugar. This research was conducted to study the processing and characterizing of *rusip* and the role of *Pediococcus acidilactici* F-11 as culture starter to improve the quality of *rusip*. The first study was surveillance of *rusip* product from producer and markets. The second study was *rusip* processing with and without starter culture of *Pediococcus acidilactici* F-11. Ten to 25% salt and 10% brown sugar respectively was mixed to upper layers of fresh fish. All materials were incubated at 30° for 12 days and fermentation was continued until 40 days. Microbiology analysis (TPC, acid lactic bacteria, and coliform), chemical analysis (pH, acid lactic, water content and salt content, TVB, TMA and reducing sugar) and physical analysis were determined, while sensory analysis was also performed. The result showed that culture starter PaF-11 with lower salt (10%) could increase total lactic acid bacteria and lactic acid, however total coliform, TVB and TMA content were lower compare to 20% salt addition. On the contrary, in higher salt (20%) can inhibit coliform, TVB and TMA content, on the other hand the lactic acid bacteria cannot grow optimal. For salt concentration on 20 % salt more effective to produce *rusip* and safe to be consumed.

Keywords : *Rusip*, fermented, lactic acid bacteria, *Pediococcus acidilactici* F-11

Effect of *Lactobacillus plantarum* FNCC 0364 Culture on Microbiological
Characteristic of *Kembung* Fish "Peda"

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ABSTRACT

Peda is one of Indonesian fermented fish products which was made from *Kembung* fish (*Rastrelliger neglectus*) using high concentration of salt (up to 30 %). Due to the high concentration of salt, *peda* is salty and because of this reason, usually only small amount of *peda* is consumed by people. Therefore this product cannot be used as animal protein source. Lactic acid bacteria is a group of microorganism which play role in various food fermentations due to their ability to produce better organoleptic characteristic and they also produce lactic acid, take a role on lowering the pH and the growth of spoilage and pathogenic bacteria will be inhibited. Objective of this study was to observe the effect of *Lactobacillus plantarum* FNCC 0364 inoculation (isolated from fermented shrimp/terasi) on microbiological characteristics of *peda* fermentation.

Peda was made by two steps of fermentation. The first step fish was cleaned up, drained, mixed and smeared with salt (i.e, 15 %, 20%, 25 % of weight), put and make in layers in container, covered, and then incubated for 5 days, at room temperature. The second step; fish from first step fermentation was cleaned up using the drip water and drained. The fermentation was done by two variations, i.e, with and without inoculation of *Lactobacillus plantarum* FNCC 0364. Inoculation was done by soaking fish into 24 hours culture for 15 minutes, followed by draining and drying. Fermentation was carried out by incubation of fish in a plastic wrap for 8 weeks at room temperature. After fermentation, total bacteria, coliform and lactic acid bacteria were analyzed. The result showed that inoculation of *Lactobacillus plantarum* FNCC 0364 able to reduce coliform.

Keywords: *peda*, *Lactobacillus plantarum* FNCC 0364, salt

Product Development and Technology Roadmap
(Case Study: Aceh's Specific Local Food, *Pliek U*)

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ABSTRACT

Aceh's specific local food became an integral part of social life, economy and culture of Aceh, especially *pliek u* used as a spice in cooking. For long time Aceh's community get benefit from oil for frying and solid substrate which useful for health. *Pliek u* made from fresh coconut which run into a process of fermentation about 15 days. During the process produces three products, the first a more clear oil (*simplah oil*), the second a darker oil (*brök oil*), and third solid substrate (*pliek u*). Product roadmap and technology research *pliek u* and its derivatives have been prepared on the basis of microbiological, biochemical and pharmaceutical research that has been done. Research related development and utilization of *pliek u* (containing microbial activity) as useful food for health, and potential as pharmaceutical ingredients. This research includes basic research, applied research, publishing scientific papers, application of technology related to the final product. The purpose of this research is to identify the factors that affect fermentation's process and its technology to determine and obtain products that meet standards of food and pharmaceutical industry and set the pattern for utilization as a food and pharmacy ingredient. Product development is based on basic and application research beside technology application in laboratory and pilot plant scale. This is conducted in an integrated manner based on different disciplines. Road map study began in 2007. End of the study is planned to produce products that meet HACCP (Hazard Analytical Critical Control Point) and GMP (Good Manufacture Process), and which has a pharmacological effect which must meet the standards of Pharmacopoeia Indonesia and BPPOM Indonesian (The National Agency for Drug and Food Control Indonesian).

Keywords: local food products, microbial activity, functional foods, medicinal.

Diversity of Local Probiotic *Lactobacilli* in Tomato Juice
and its Potential as Functional Food

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ABSTRACT

Probiotic alternative using vegetables and fruits were very safety for consumption since these are not containing dairy allergen. These products are also safe for lactose intolerant consumers. Objectives of this research was to study the use of tomato juice as substrate for lactic acid bacteria (LAB) probiotic which isolated from pickled of vegetables and fruits. Special objective was to study the ability of tomato juice probiotics as functional food in the reduction of blood cholesterol and reduction of *E. coli* number in faeces of mice. The research was designed experimentally. The treatment was starter dosage that consist of three treatments: SA0 (0 ml), SA1 (0.3 ml), SA2 (0.6 ml), SA3 (0.9ml) that three times replicated. The result of the research shown that dosage 0.6 ml of local probiotic *Lactobacilli* in tomato juice can reduce the number of cholesterol in the blood of mice is 24 mg/dl and also decrease the number *E.coli* in faeces of mice.

Keywords : *Lactobacillus sp.*, dosage, cholesterol, *E.coli*

Antibacterial Activity of Synbiotic Green *Cincau* Drink on Diarrhea-Causing Pathogenic Bacteria During Storage

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ABSTRACT

One of the tropical diseases often contagious communities is diarrhea. Consumption of drink fermented by lactic acid bacteria, such as synbiotic green *cincau* drink is known will suppress the growth of diarrhea-causing pathogenic bacteria. The aims of this study were to determine the ability of the antibacterial activity of synbiotic green *cincau* drink against pathogenic bacteria that cause diarrhea and the effect of storage duration on the ability of antibacterial activity of synbiotic green *cincau* drink. This research was conducted to obtain qualitative data on the antibacterial activity of synbiotic green *cincau* drink against diarrhea-causing pathogens bacterial (*Staphylococcus aureus*, *Salmonella sp.*, *Bacillus cereus*, and *Escherichia coli*). The product was stored for 28 days in the cold temperature ($\pm 10^{\circ}\text{C}$). Observations were carried out once every 7 days on antibacterial activity, pH, total acid, and total lactic acid bacteria. Antibacterial activity was evaluated using agar diffusion method. The results showed that the antibacterial activity, pH, and total of lactic acid bacteria of synbiotic green *cincau* drink decreased along the length of storage periode. Meanwhile, total of lactic acid increased. The results appeared that *Salmonella sp.* was the greatest inhibited by antibacterial agents in synbiotic green *cincau* drink. The lowest inhibition of synbiotic green *cincau* drink was found on *Staphylococcus aureus*. During the cold temperature storage, the synbiotic green *cincau* drink contained total of lactic acid bacteria ranged 9,54-10,12 (Log_{10}) or equal $3,5 \times 10^9$ - $1,3 \times 10^{10}$ CFU/ml, total of acid value 0.42% -0.87%, and pH 3, 80-4.10.

Keywords : Synbiotic, Antibacterial Activity, Green *Cincau*, Diarrhea-causing bacteria

Production Bacteriocins from Lactic Acid Bacteria (LAB) Strain SCG 1223 In Molasses Media

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ABSTRACT

Objectives of this research are to obtain the effisien formula medium based on molasses in the production of bacteriocin by lactic acid bacteria SCG 1223 and to study the ability of this bacteriocins in the inhibitory of bacterial pathogens. Bacterial indicator was needed to know the ability of bacteriocins to inhibit the growth of bacterial pathogen. The more bacterial pathogen species which can be inhibited by bacteriocins more wide the spectrum of inhibitory activity. The inhibitory activity of bacteriocins was detected by the transparent zone around the colony. According to the result of this research, formula media M4K1P2 which consist of molasses 4%, yeast extract 1%, peptone 2% and tween 80% is effective in production of bacteriocins which can inhibit bacterial pathogen. The formula M4K1P2 has inhibitory activity 1004.80 AU/ml against *E. coli*, 2047.59 AU/ml against *L. monocytogenes* and 529.80 AU/ml against *S. thypimurium*.

Keywords: bacteriocins, production, lactic acid bacteria, molasses media

Exploration of Bacteriocin from Lactic Acid Bacteria As Antibacteria and The Effect to Therapeutical of Dairy Cattle Sub Clinic Mastitis
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ABSTRACT

The exploration of bacteriocin characteristicity which was produced by Lactic Acid Bacteria (LAB) as antimicrobial, that could inhibit the growth of indicator bacteria *Escherichia coli*, *Staphylococcus aureus*, and *Streptococcus agalactiae*. This study was also characterize therapeutic effect of bacteriocin on sub clinical mastitis in dairy cattle.

The method use in this study was isolation, selection and identification of LAB using Mann Rogosa Sharp Medium, followed by characterization of the bacteriocin produced by LAB. The result of the study showed that bacteriocin isolated from beef cattle's intestine could inhibit the growth *Escherichia coli*, *Staphylococcus aureus*, and *Streptococcus agalactiae*, which was indicated by halo zone surrounding the colonies on Brain Heart Infusion Agar plate. The heat stability of bacteriocin were exposed to 80 °C for 30 minutes and 100 °C for 15 minutes, and inactivated by proteolytic enzymes such as trypsin and pepsin. It was not inactivated by lipase, and resistance organic substance hexane and diethylether.

The species of LAB was than identified as *Pediococcus pentosaceus* by 16's RNA sequencing. The characteristics of the species was coccoid, Gram positive, produce acid from glucose, maltose, mannose, and sucrose. This approach was suggested the development of bacteriocin as therapeutic agent for sub clinical mastitis in dairy cattle.

Keywords: Bacteriocin, Lactic Acid Bacteria, Sub Clinical Mastitis

Product Utilization of Tofu Whey Fermentation by *Lactobacillus plantarum* FNCC 0123 as a Coagulant and the Effect on Tofu's Characteristics

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ABSTRACT

Lactobacillus plantarum is a lactic acid bacteria which can use oligosaccharides during fermentations. Tofu whey, a by-product of tofu production, is a good source of carbohydrates, as well as protein and magnesium. In this study, tofu whey was used for production of lactic acid by fermentation using *Lactobacillus plantarum* FNCC 0123. This fermented whey was used as a coagulant in tofumaking as well as *kecutan* as control, then the characteristics of tofu prepared using these coagulants were determined. *Lactobacillus plantarum* FNCC 0123 were grown in MRS broth before being inoculated in tofu whey. Tofu whey supplemented with coconut water (0.5% whey) then incubated in 37 °C for 24 hours. The acidity (pH) and total of titratable acid were determined at hour 0, 1, 2, 4, 5, 8, 12, 16, 20 dan 24. The characteristics of tofu then were analyzed. Tofu prepared using fermented whey had total crude protein, ash and fat content higher than tofu prepared using *kecutan*. Tofu with *kecutan* coagulant were more compact and solid then fermented whey tofu, and also contain stronger beany odor and flavor.

Keywords: *Lactobacillus plantarum*, lactic acid bacteria, tofu whey, tofu, fermentation

The Growth of *Pediococcus acidilactici* F11 in Tofu Whey

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ABSTRACT

The liquid by product of tofu manufacture, tofu whey, was used as a growth medium for *Pediococcus acidilactici* F11 and lactic acid production. In tofu manufacture, tofu whey was spontaneously fermented at over night, and it called *kecutan*. *Kecutan* at pH 3,9 with content of lactic acid 3,43 g/L is able to be used as soymilk coagulant. In this research, tofu whey supplemented with coconut water as carbon source at concentration 25% and 50% will be fermented by *Pediococcus acidilactici* F11. *Pediococcus acidilactici* F11 was able to grow and to produce lactic acid on tofu whey. Total of lactic acid bacteria that grew in each media during 24 hours fermentation showing no differences. However, the supplementation of coconut water in tofu whey, increasing the specific growth rate of *Pediococcus acidilactici* F11. Fermented tofu whey supplemented with 25% and 50% coconut water, meet the requirement condition for them as soymilk coagulant, with the production of lactic acid 3,8592 g/L and 4,221 g/L with pH 3,7 and 3,6, respectively. Supplementation of 25% coconut water is effective, indicated by less residu of reduction sugar at the late of fermentation.

Keywords: *Pediococcus acidilactici* F11, tofu whey, lactic acid, fermentation

Producing of 125 Liter Capacity of Fermentor for Tofu Whey Fermentation Using *Pediococcus acidilactici* F11 as a Starter Culture

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ABSTRACT

Kecutan is one kind of the coagulant for tofu production that comes from spontaneous fermentation of tofu whey by bacteria from the environment during overnight. The type and number of bacteria that have role in the *kecutan* fermentation can vary from one fermentation to another fermentation. As a consequence, quality of tofu from this coagulation process also less stable. Based on the previous research, tofu whey fermented with pure culture of *Pediococcus acidilactici* F-11 have characteristic that can be used as an alternative coagulant. In industrial scale, to provide good environmental conditions for the fermentation of culture of *Pediococcus acidilactici* F11, fermentor is needed. The aims of this research were (1) to create a 125 Liter capacity of fermentor and implemented at tofu industry (CV. Kitagama); (2) to ferment tofu whey from the first to fifth day tofu production using *Pediococcus acidilactici* F-11 as a starter culture. This fermented tofu whey was directly use for coagulation processing. Final population of lactic acid bacteria from five batch fermentation using *Pediococcus acidilactici* F11 in 125 Liter capacity of fermentor for 16 hours have average of 1.19×10^9 CFU/ml, whereas the non-BAL and *coliform* bacteria have an average of 1.8×10^2 CFU/ml, and less than 10 CFU/ml. Acidity and pH at the end of fermentation tofu whey already meet as coagulant with average 3.54 g/L 3.94 g/L. Five batch of *kecutan* fermentation using 125 Liter capacity of fermentor showed reproducible results.

Keywords: *kecutan*, tofu whey, *Pediococcus acidilactici* F-11, fermentor

Tofu Whey Fermentation by *Pediococcus acidilactici* F11 using 125 Liter Capacity of Fermentor

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The purpose of this study isto determine the influence on heating of tofu whey and inoculum on the growth of lactic acid bacteria and lactic acid production in tofu whey fermentation by *Pediococcus acidilactici* F 11 in 125 Liter capacity of fermentor. Tofu whey was heated at 100 °C for 15 minutes and without heating. This research was conducted with inoculating *Pedicoccus acidilactici* F11 on tofu whey with different concentrations of inoculums, so that the concentration of lactic acid bacteria at the beginning of fermentation is 10⁴, 10⁵, 10⁶ CFU/ml. With the control treatment without heating and without addition of inoculum. Initial temperature of fermentation is 40°C and at 0, 2, 4, 8, 12, 16 hour fermentation observed amount of lactic acid bacteria, bacterial contaminants, pH and lactic acid production. Heating of tofu whey on tofu whey fermentation by *Pediococcus acidilactici* F11 in 125-liter fermentor haad no significant effect on the growth of lactic acid bacteria and bacterial contaminants and lactic acid production. More a lot concentration of inoculum up to 10⁶ CFU/ml will improve and shorten of acid production time. Tofu whey production that inoculated with 10⁵ CFU/ml can be achieved within 8 hours. Bacteriosin production during tofu whey fermentation by *Pediococcus acidilactici* F11 in 125-liter fermenter has not shown consistent results

Keywords: Tofu whey, *Pediococcus acidilactici* F11, lactic acid bacteria, bacteriosin.

Tofu Characterization Using Acid and Salt Coagulants in Industrial Scale

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ABSTRACT

Coagulation method is a determined factor of tofu characteristics. The objective of this study was to observe the application of acid and salt coagulant towards the characteristics of tofu resulted in industrial scale. The coagulants used were lactic acid, acetic acid, rice vinegar, calcium sulfate, and magnesium sulfate. Research steps consisted of orientations and evaluation of tofu production. The orientations were aimed to find the limit concentration of each coagulant and to choose one concentration of each coagulant based on the yield and protein content. Evaluation of tofu production was performed using comparison of 18L coagulant solution to 45L soymilk. The concentrations applied in this study were as followed as 0.26% lactic acid, 0.18 acetic acid, 0.023M calcium sulfate, 0.029M magnesium sulfate, and 33.3 ml/l rice vinegar. Tofu evaluation was based on tofu composition (moisture content, total protein content, and ash content), firmness and cohesiveness. The result of this study showed the protein coagulation efficiency of each coagulant is 62-64% of soybean protein. Salt coagulant provides tofu characteristics higher yield, firmer and lower cohesiveness than acid coagulant.

Keywords : tofu characteristics, coagulant, concentration, lactic acid, salt

Improvement of Yield and Tofu Quality on CV. KITAGAMA through Extraction Process, Heating Soymilk and Coagulation

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ABSTRACT

Most of the tofu-making process of the household scale in Indonesia could be said to be less optimal, because there were still many amount of protein on fibre (*okara*) and whey. In this research we learn about methods of extraction, heating of soymilk and variation of the coagulant (*kecutan* or fermented whey) added in tofu-making process intended to reduce lost of protein. Hot extraction was able to produce the yield (wb) amounted to 252.88 % and increased the weight (wb) of tofu 16.20 %, but no significant effect on dry weight (db) and yield (db). Syneresis figures from the hot and cold extraction were 20.02 and 16.29 %, respectively. Cold extraction produced tofu with better sensory quality, ie 4.40 for color, 3.80 for odor, 3.40 for taste, 3,80 for texture of the scale of 1 to 5 rating. The elasticity and firmness were no significantly different. Two-steps heating produced weight (wb), dry weight (db), weight minus syneresis, yield (wb), and yield (db) greater than one-step. Two-step heating was able to reduce syneresis and increased the strength of tofu. Soluble protein and total protein of the two-step heating were 0.0775 mg/ml and 859 g, respectively. Reducing the amount of coagulant can increase the weight (wb), dry weight (db), weight minus syneresis, yield (wb and db). With the reduce number of coagulant, syneresis and strength of tofu become less. Optimum coagulant volume was 10 Liter which produced whey with the lowest turbidities 101 mg/ml and total protein content (db) 912 gram.

Keywords: tofu, yield and quality, extraction, heating soymilk, concentration of coagulant

Probiotic Ability Test from Lactic Acid Bacteria Isolates of Infant Formula Milk Powder and Effect of Rehydration Temperature on Probiotics Viability

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ABSTRACT

Milk powder formula is generally consumed by children at age 6-24 month. At this age, children are still vulnerable to disease, especially gastrointestinal disturbances due to activity of pathogenic bacteria in the body, abdominal bloating, constipation, diarrhea and others. Therefore, there are infant formula milk powder formulas enriched with probiotics in order to enhance the immune system of children against intestinal disorders. One of the most important to consider in consuming these products is rehydration temperature of formula milk powder.

This research was conducted to determine the ability of infant formula probiotic to inhibit the growth of pathogenic bacteria, their resistance to low pH and to determine the effect of rehydration temperature on the viability. Four probiotic formulas were used in this study, i.e., Dancow Lactobacillus Protectus, Chilkid Platinum, Kidzee Platinum and NAN 2 Probiotics. Analysis consist of the inhibition of probiotic against pathogenic bacteria (*S. aureus* and *E. coli*) using agar diffusion method, resistance of probiotics to pH 2 and pH 3 and the influence of rehydration temperature on the probiotics viability. Data obtained were analyzed descriptively.

Results showed that all four products containing probiotics. It is known that all isolates obtained from all the products have the ability to inhibit the growth of pathogenic bacteria with a diameter of clear zone range about 1.73 to 2.07 cm on *S. aureus* and 1.53 to 1.87 cm on *E. coli* and the isolates have resistance to low pH with different degrees of resistance, where the number of probiotics on pH 2 have decreased with the range about 10^3 - 10^5 CFU/ml and on pH 3 decrease at the range 10^1 - 10^2 CFU/ml. According to the data on the rehydration temperature showed that rehydration at 40°C could increase the viability of probiotics. However, rehydration at 60°C and 85°C resulted in the decreased of probiotic viability.

Keywords: Infant formula milk powder, probiotics, rehydration temperature, viability, antimicrobial, acid resistance

Isolation, Identification, and Application of *Lactobacillus rhamnosus* (SKG 15a₁) from Sumbawa Wild Horse Milk for *Dadih* Production as Blood Cholesterol Reduction

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ABSTRACT

Fifty isolates from milk of wild horse were identified using API 50CH and API 50CHL version 5.0 kits, and analyzed using descriptive method. The results showed five isolates with the highest antibacteria activity i.e. SKG 10; SKG 15a₁; SKG 42; SKG 44; and SKG 50. Isolates of SKG 10, and SKG 15a₁ were identified as *Lactobacillus paracasei* ssp 2, and *Lactobacillus rhamnosus* respectively. Isolates of SKG 42, SKG 44, and SKG 50 were identified as *Lactobacillus paracasei* ssp paracasei 1. Furthermore, SKG 44 and SKG 15a₁ were used as dry starter for fermentation of *Dadih* from milk of wild horse (*Dakuli*). *Dakuli* with total acid 1.36%, lactic acid bacteri 1.39×10^8 cfu/g, and viscosity 7.24 CP can be introduced to daily menu to support the healthy smart people. Thirty white male rats (*Rattus norvegicus*), 2-3 month old with the weight of ± 100 g were obtained from *Sesetan*. Rats were fed with high fat feed (standard feed : egg yolk =75:10). Parameters measured were the amount of *Dadih* consumed and total blood serum cholesterol of rats. Data obtained were analyzed by ANOVA and followed by LSD (*Least Significant Difference*) test. The differences were considered to be significant at $P < 0.05$. The SPSS 15.0 for Windows 2006 was used to determined if variable differed among treatment groups. The results showed that total cholesterol content in blood serum of rats decreased (42.40%) with the feeding of 0.9 ml *dadih* from milk of wild horse per day per 100 g of rat weight for 42 days or equal to 87.1 ml/day/60 kg human body weight.

Keywords: Milk of wild horse, *Dakuli*, cholesterol, and lactic acid bacteria

Resistance of Lactic Acid Bacteria Isolated From Indonesian Fermented Foods in Simulated Gastric Juice and Bile Solution

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ABSTRACT

The aim of this research was to study the viability of lactic acid bacteria isolated from Indonesian fermented foods in simulated gastric juice and bile solution. Ten isolates i.e *L. plantarum* Mut 13, T3, Dad 13, Mut 7, *S. thermophilus* Mut 14, Mut 15, Mut 20, Mut 29, Dad 11 and *L. acidophilus* SNP2 (currently identified as *L. Paracasei* SNP-2) were exposed to simulated gastric juice (pH 1.5, 2.0, and 3.0) and bile solution (1.5%, 2%, 3%). All isolated exhibit resistance to bile solution (1.5%, 2% and 3%) during 4 hours and 6 hours incubation. Three isolates i.e *S. thermophilus* Mut 29, Dad 11 and *L. plantarum* Mut 13 was more susceptible to 2% bile solution.

During exposure in simulated gastric juice, all isolates cannot survive in simulated gastric juice pH 1.5 during 4 and 6 hours incubation. All isolates were tolerant in simulated gastric juice pH 2.0 during 4 hours incubation and showed a lower population reduction i.e 3 log cycle up to 2 log cycle. After 6 hours incubations, 6 isolates (*L. plantarum* Mut 13, *S. thermophilus* Mut 14, Mut 15, Mut 20, Mut 29 and *Streptococcus* sp. Dad 11) exhibited significant decrease 7 log cycle up to 5 log cycle. *Streptococcus* sp. Dad 11 was more susceptible to simulated gastric juice pH 2.0 during exposure for 4 and 6 hours incubation. All isolates exhibited high resistance in simulated gastric juice pH 3,0 during 4 hours incubation. During 6 hours incubation, four isolates (*S. thermophilus* Mut 14, Mut 15, Mut 20, and Mut 29) are decrease 5 log cycle. This research has shown that lactic acid bacteria isolated from Indonesian fermented foods has a potential to be a probiotic candidate (resistance in low pH and bile solution).

Characteristic of Indigenous Lactic Acid Bacteria of *Dadiah* as The Candidate for Probiotics in Gastrointestinal Condition by In Vitro

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ABSTRACT

Probiotic bacteria is defined as live microorganisms which will confer health benefit to the host when administered in adequate amounts. The aims of this research were to study the potential of *Bifidobacterium longum* RRM-01, *Lactobacillus acidophilus* RRM-01, *Lactobacillus plantarum* RRM-01, and *Lactococcus lactis* RRM-01 as probiotic bacteria through their ability to grow in gastrointestinal conditions (acid conditions of stomach and the presence of bile salts in the small intestine); their resistance to antibiotics; and their antimicrobial properties against pathogen bacterias. This study initiated with assays of four tested Lactic Acid Bacteria for its ability to grow and survive in acid conditions, bile salts, and antibiotics, also their antagonistic activities against indicator strains of pathogenic bacteria (*Staphylococcus aureus* ATCC 25923, *Salmonella thypimurium* ATCC 14028, and *Escherichia coli* ATCC 25922). Result obtained from assay of ability to grow in acid conditions, presence of bile salts, and antibiotics showed that *B. longum* RRM-01 and *L. acidophilus* RRM-01 had better resistance than *L. plantarum* RRM-01 and *L. lactis* RRM-01 (t-test). Result of statistical test ($P < 0.01$) showed that difference tested LABs influenced diameter of the inhibition zone against indicator bacteria, which was *L. acidophilus* RRM-01 had the largest inhibition zone against *S. aureus* ATCC 25923 and *Escherichia coli* ATCC, while *B. longum* RRM-01 was able to produce the largest inhibition zone against *S. thypimurium* ATCC 14028. Therefore the four tested LABs can be identified as probiotic bacteria.

Keywords: probiotic, LAB, gastrointestinal conditions, antibiotics, antimicrobial

Isolation and Identification of Bacteria Chicken Intestinal as Candidate Probiotics

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ABSTRACT

Study of isolation and identification of chicken intestinal bacteria using medium MRS as candidate probiotic has been done. The purpose of this study was to obtain probiotic from chicken and subsequently can be used as a probiotic for chicken. The study consisted of isolation and identification stages. Isolation was done using MRS medium with pH 6.8 and pH 4. While identification into genera level was carried out based on morphological character, Gram staining, catalase test and identification into species level was based on the API test.

From the isolation using MRS medium with pH 6.8 and identification could be isolated two strains belong to *Lactobacillus* and one strain belong to *Bacillus*. Using MRS medium with pH 4 obtained 4 isolates; belong to *Lactobacillus*, *Streptococcus* and *Bacillus*. Based on the API test result, these isolates were identified as *Lactobacillus plantarum*, *Lactobacillus delbrueckii* spp *delbrueckii*, *Lactobacillus fermentum*, *Bacillus licheniformis*, *Bacillus amyloloquefaciens*, and *Streptococcus* sp.

Keywords: probiotic bacteria, isolation and identification, chicken intestine, the API test

Resistance of *Lactobacillus* sp. F2 in the Intestinal Tract and its Functional Effect to Reduce Blood Cholesterol Content of Rats

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Lactobacillus sp F2 is an indigenous strain of Indonesia that have been tested for its survival under intestinal tract condition (*in vitro*) and its ability to hydrolyze bile salt and this strain is potential to reduce blood cholesterol content. For the development of this strain as a potential probiotic its ability to colonize intestinal tract and to reduce blood cholesterol content *in vivo* needs to be investigated.

Rats were administrated with 10^8 cells/day of *Lactobacillus* sp. F2 for 3 week by *oral gavage*. Following this, the total lactic acid bacteria (LAB) population, *anaerobic* bacteria in the ceccal content and blood cholesterol content were analysed using MRS Agar, *anaerobic* agar and cholesterol kit, respectively. For the confirmation of the colonization of *Lactobacillus* sp. F2, RAPD method with specific primer (M13R) was applied.

The results showed that the total LAB in the intestine of rats administrated with *Lactobacillus* sp. F2 was about 1.99×10^9 CFU/g while is the ceccal rat found 9.36×10^7 CFU/g . About 48.99% of the total LAB consisted of *Lactobacillus* sp. F2, indicating that *Lactobacillus* sp. F2 had the ability to colonize the rats intestinal tract. High total number of LAB resulted in lower pH in the intestinal tract of rats treated with *Lactobacillus* sp. F2 when compare to the control (5.68 in the treated rats and 6.02 in the control). A decrease in blood cholesterol content by 33% in the treated rats was also observed in this experiment when compare to the control. The latest tendency was suspected to be due to fermentation process and hydrolysis of bile salts by *Lactobacillus* sp.F2.

The above results showed that *Lactobacillus* sp. F2 is potential to be developed as an indigenous probiotic, although some intensive research, especially on the development of delivery methods of this probiotic candidate along intestinal tract need to be conducted in the future.

Keywords : *Lactobacillus* sp. F2, Colonization, Cholesterol, RAPD, Probiotic

The Effect of Potential Probiotic *Lactobacillus plantarum* Mut7 (FNCC 250) on Peritoneal Macrophages Activity of Balb/c Mice

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Activation of the immune system by immunomodulator can be used as a therapy or prevention of disease. Previous studies indicate that probiotics may act as an immunomodulator agents. However, research on the immunomodulatory effect of local probiotics has not been done yet. In preliminary study, we had already studied the immunomodulatory effect of some heat-killed local probiotic. The aim of this study was to study the effect of *Lactobacillus plantarum* Mut7 on the activity of peritoneal macrophage cells of Balb/c mice infected with *Salmonella typhimurium*.

The results showed that administration of *L. plantarum* Mut7 could activate peritoneal macrophages in mice that did not infected with *Salmonella typhimurium*. The percentage of macrophages cells which engulf the latex particle was increased up to 92,08% compare to control (79,06%). The mean number of latex that was engulfed by macrophages cells was also increased up to 9 latex beads per macrophages cells compare to control (5 latex beads). However, in mice infected with *Salmonella*, *L. plantarum* Mut7 could not increase the phagocytic activity of peritoneal macrophages. In conclusion, probiotic *L. plantarum* Mut7 could increase the phagocytic activity of peritoneal macrophages cells in Balb/c mice that did not infected with *Salmonella typhimurium*.

Keywords: *probiotic*, *immunomodulator*, *phagocytic activity*, *peritoneal macrophages*

Isolation and Characterization of Class II Bacteriocin from *Lactobacillus* species

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ABSTRACT

Lactic acid bacteria (LAB) commonly used in food as starter cultures are known to produce antimicrobial substance such as bacteriocin which has great potential as food preservative. Out of 130 bacterial isolates obtained, 98 isolates were identified as gram positive- non spore forming cocci, coccobacilli and rods. All these were identified as LAB by biochemical characterization. LAB - 19 showed maximum zone of inhibition (22-24mm) against food borne (*Listeria monocytogenes*, *Staphylococcus aureus*) and human pathogens (*Escherichia coli*, *Salmonella typhimurium*, *Aeromonas*, *Micrococcus*) and were selected for further study. Growth of Lactic acid bacteria and bacteriocin activity was maximum at 22 h of incubation period, at temperature of 35° C, at pH 6.0 and at NaCl concentration of 0.6%, of the culture medium. Monosaccharides and disaccharides were found to be the best carbon source for the growth and bacteriocin activity compared to polysaccharides and oligosaccharides. Bacteriocin was found to be more stable at 121° C for 15mins and also stable at wide pH range of 3.0- 8.0. It showed 100% stability for 25 days at room temperature (28- 32°C). Addition of surfactant at 0.6% showed increase in bacteriocin activity. Bacteriocin from the isolate was purified to its homogeneity by ammonium sulphate precipitation and by gel filtration chromatography. Molecular weight of bacteriocin was determined as 5.6kDa by SDS page and LC-MS.

Production of 4-vinyl guaiacol from Ferulic Acid by *Lactobacillus farciminis*

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ABSTRACT

In this study, the potential of *Lactobacillus farciminis* ATCC 29644 for biotransformation of ferulic acid to 4-vinyl guaiacol (4VG) was investigated. It is a volatile phenol, reported to have 40-fold higher economic value than ferulic acid and is biotransformable to acetovanillone, ethylguaiacol and vanillin. Ferulic acid is an important bioactive constituent of agro-industrial wastes such as brans, husks, cobs, bagasse, fiber and lint. Biotransformation started after 5 h incubation of *L. farciminis* with ferulic acid in Man Regosa and Sharpe (MRS) broth at 37 °C under 5% CO₂ and production rate was at its peak after 48 h. Identification and of 4VG was done using GC/MS and subsequent quantification of yield by HPLC. The impact of initial concentrations of ferulic acid and bacteria on the production of 4VG was studied and yield of product was found to be three-fold than the initial ferulic acid concentration. The results indicated that the production of 4VG was significantly affected by the initial concentration of ferulic acid, and empirically 0.1, 1.45 and 3 mg/ml of ferulic acid yielded 0, 3.34 and 10.26 mg/ml of 4VG, respectively. The findings are a milestone towards safe high yielding means of biotransforming some common agro-industrial wastes to a value added product.

Keywords: Ferulic acid, 4-vinyl guaiacol, *Lactobacillus farciminis*, biotransformation

The Effects of Cow Milk Evaporation and Pasteurization towards Streptomycin Residue Contents on Milk Products

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Streptomycin is one of the antibiotic residue that common find in milk. These residues can be harmful, it possibly cause allergic reaction, lost of hearing and body balance, also bacterial resistance toward these antibiotics. Streptomycin is fairly stable and resistant to heating, therefore the residue were also frequently found on pasteurized and evaporated milk products.

This experimental research based on Completely Randomized Design with three treatments and six replications. The treatments was High Temperature Short Time (HTST) pasteurization process (90°C during 25s), evaporated milk process (60-70°C during 2 h until milk coagulated) and sweet condensed milk process (70-77°C during 2 h until milk coagulated). The results were analyzed using t-test, analysis of varian and Duncan's new multiple range test.

The result showed that HTST pasteurization process give best streptomycin residue reduction. These treatment showing decrease of streptomycin residue from 100% to 85.73%, while other treatments such as evaporated milk process gives streptomycin residue concentrated increase until 127.42% and sweet condensed milk process were also gives an increase of streptomycin residue concentrated increase until 119.18%.

Keywords : evaporation, milk products, pasteurization, streptomycin residue

Effect of Temperature and pH on Growth of *Lactobacillus acidophilus* FNCC 0015 and Acceptibility of Noni (*Morinda citrifolia*) Probiotic Drink

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ABSTRACT

The aims of this research were to study optimum temperature fermentation and initial pH to produce probiotic drink of mengkudu (*Morinda citrifolia*). Mengkudu extract produced from mengkudu fruit : water = 1:2. The starter medium made by mengkudu extract 400 mL, 2% skim milk and 4% glucose pasteurized at 80°C, 10 minutes. The substrate was inoculated by 1 ose of *Lactobacillus acidophilus*, incubated at 37°C, 24 hours. The production medium made by 400 mL mengkudu extract, 12% skim milk, 6% glucose, the pH was adjusted on 3,5; 4,5 and 5,5 and pasteurized at 80°C, 10 minutes. The sterile media inoculated by 10% starter and incubated on 37°C, 41°C and 45°C. The evaluations of fermentation process were total of lactic acid bacteria, lactic acid concentration, final pH and preference test. The prepered mengkudu probiotic drink was produced by fermentation on initial pH 4,5 and 37°C that contained 9,4 x 10⁸ CFU/ml and 0,92% lactic acid.

Keywords: noni, probiotik drink, *Lactobacillus acidophilus*

Ability of Laminaran Prebiotic from Brown Algae *Sargassum duplicatum*Anies Chamidah¹, Y. Marsono², Eni Harmayani², and Haryadi²¹ Faculty of Fisheries and Marine Sciences, Brawijaya University, Malang² Faculty of Agricultural Technology, Gadjah Mada University, Yogyakarta

ABSTRACT

Investigating the potential of prebiotic Laminaran from brown algae *Sargassum duplicatum* have been done. Laminaran influence on the growth of bacteria was also studied. Laminaran fermentation capability was tested by mixed fecal bacterial culture. Incubation for 24 hours, temperature and pH controlled, anaerobic culture used to determination laminaran effect on fecal microbiota composition. Fermentation end products were tested using GC to determine the levels of SCFA, also conducted tests Prebiotic index (PI).

In vitro study showed that the number of Bifidobacteria and Lactobacilli at the beginning was lower in the medium with laminaran fiber source than when grown on control medium and grown on medium with inulin fiber source. But a sharp increase occurred after 24 hours incubation period. While laminaran effect on enteric bacteria, there are 2 conditions: an increase (in *Bacteroides fragilis* and *Salmonella thypimurium*, whereas *E. coli* occurs only a slight increase) but in *Staphylococcus aureus* and *Bacillus subtilis* decline. Laminaran able to increase the number of Bifidobacterium and Lactobacillus produce prebiotic index lower than inulin. Fermentation laminaran increase the production of acetic acid and propionate.

Characteristics of Lactic Acid Bacteria Isolated from Cassava Starch Fermentation Mixture

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ABSTRACT

The objective of this work was to study characteristics of the lactic acid bacteria isolated from cassava starch fermentation mixture and identify their genus. Samples were taken from cassava fermentation tank after 2 d incubation, plated them on MRS media containing 1 % calcium carbonate and 0.01 % sodium azide. The inoculated media were then incubated at 37°C until the bacterial colonies were observed. The colonies were purified and assayed for morphological, physiological, and biochemical properties. Totally, ten colonies of lactic acid bacteria were isolated and all of them were found to belong to the genus of *Lactobacillus*.

Keywords: Isolate, characteristics, lactic acid bacteria, fermented cassava starch

Effect of Fermentation of Cassava Starch with *Lactobacillus plantarum* subsp. *Argentoratensis* NBRC 106468 on Baking Property and Characteristics of the Starch

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ABSTRACT

The objective of this study was to obtain a method to improve baking property of cassava starch by lactic acid. Submersed fermentation of cassava starch was prepared by inoculating *Lactobacillus plantarum* subsp. *argentoratensis* NBRC 106468 into freshly prepared cassava starch followed by incubating it at room temperature for 2 d. Samples were taken periodically every 4 h and analyzed for cell number (MRS medium), pH, and acidity. At the end of the fermentation, the starch was analyzed for baking property expressed as specific volume of the baked starch dough, and characterized for viscosity, amylose, carbonyl, and carboxyl contents. The properties of fermented cassava starch were compared to those of unfermented cassava starch and cassava starch soaked in 1 % lactic acid for 10 min. The fermented cassava starch had pH of 3.5 and acidity of 1.18 %. Lactic acid fermentation improved the baking property of the starch. Specific volume of the baked fermented starch was 10.47 ml/g, compared to 7.02 ml/g of baked unfermented starch and 8.47 ml/g of baked chemically acidified starch. The fermented starch had higher amylose, carbonyl, and carboxyl contents but lower viscosity than the unfermented starch or the starch acidified with lactic acid.

Keywords: Baking property, cassava starch, fermentation, *Lactobacillus plantarum*

Lactic Acid Bacteria for Fermentation of the Modified Corn Flour Production

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ABSTRACT

Indonesia imported wheat up to 5 million ton a year. In order to reduce of hugely imported wheat, the modified corn flour is promising material either to substitute or instead of wheat flour as material of food and feed industry. This research was conducted to obtain modified corn flour technology by adding of lactic acid bacteria for fermentation processing. Bacterium starter culture of *Lactobacillus brevis* and *L. casei* were used in this research. Result of this research have indicated that physical properties of modified corn flour i.e. : transparency of paste, solubility, swelling power, and freeze-thaw were :14.45 - 29.40% T, 1.28 g/cm³, 5.50 - 78.60%, 41.91-77,70%, and 80.31-90,81 per g water respectively. Lengthening of soaking time increasing viscosity of the corn flour solution. Added of *L. brevis* for 3 days soaking time resulted the highest viscosity of flour solution as similar as wheat (180 BU). Observation of bread quality consists of volume, hardness, and organoleptic test. Based on the quality, bread made from modified corn flour has 990-1290 m³ of volume. Good quality of bread made from corn flour resulted by 3 days soaking treatment using *L. Brevis*.

Keywords : bread, corn, fermentation, flour, lactic acid bacteria.

Survival of Freeze-dried *Lactobacillus rhamnosus* R21 in The Presence Skim Milk as Protectant during Storage

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ABSTRACT

Lactic acid bacteria are the most important bacteria having potential as probiotic. The objectives of the present study were to evaluate influence of skim milk as protectant on survival of freeze-dried *Lactobacillus rhamnosus* R21 which is isolated from breast milk during storage and to calculate the shelf-life of freeze dried *Lactobacillus* culture. To predict the shelf life of freeze dried culture, further experiment was conducted by storage the freeze dried of *Lactobacillus rhamnosus* R21 at RH 75 and RH 80 and shelf life was predicted by sorption isotherm method. Evaluation was done on under act water content, viability, water activity, acidification activity. The result showed that water content and water activity increased during storage from 2.17% db - 21.59% db and 0.099 - 0.801 respectively. Viability and acidification activity of freeze-dried culture decreased from 11.49 log cfu/g - 0 cfu/g. The predicted shelf life of the freeze dried *Lactobacillus rhamnosus* R21 culture if initial water content is 2.17% db, packaged in aluminium foil laminated by PE (polyethylene) and temperature 30°C are 5.86 years at RH 75 and 5.10 years at RH 80.

Keywords : *Lactobacillus rhamnosus* R21, breast milk, freeze drying, cryogenic, shelf life

Hepatoprotective Effect of Tempegurt on Paracetamol Induced Hepatotoxicity in Wistar Rats

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ABSTRACT

Paracetamol are antipyretic and analgesic drugs that cause liver and kidney damage. The damage of the liver was probably caused due to radical activity. Tempe is one of the local foods that have an isoflavone known as antioxidant to prevent a cancer. Processing tempe to tempegurt can increase the isoflavon-aglycone and antioxidant activities in tempe. This study was carried to investigate the effect of tempegurt on rats liver damage cause by high doses of paracetamol.

A twenty four (24) wistar rats aged 2 month were given paracetamol at doses 4 gram/kg body weight orally. On the next day, blood was collected to analyze ASAT, ALAT, albumin and BUN pre test. Rats than divided into 4 groups that are the negative control, tempegurt 2 gram, tempegurt 4 gram and tempegurt 8 gram. After 2 and 4 weeks, blood was taken to investigate ASAT, ALAT, albumin and BUN.

ASAT, ALAT, albumin and BUN were found significantly different ($p < 0,05$) on weeks 2 and 4. ASAT, ALAT, albumin and BUN was found lower in tempegurt 8 on weeks 2 (30,83±0,22; 33,86±0,238; 4,67±0,03; 46,08±0,85 respectively) and weeks 4 (27,14±0,13; 28,35±0,25; 3,78±0,04; 27,89±0,27 respectively). After given in 4 weeks, Tempegurt contribute about 80,4% on liver recovery. Tempegurt has an activity to protect the liver and tempegurt 8 gram has the strongest activities on protecting the liver due to toxic dose of paracetamol.

Keywords: paracetamol, tempegurt, ASAT, ALAT, albumin, BUN.

Effect of Level of Molasses and Incubation Time on the Score of Gram (+/-) Bacteria and Total of Lactic Acid Bacteria in the Pellet Made from Agro-Industrial by Products.

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ABSTRACT

Research to studying the effect of incubation time and level of molasses on total number of lactic acids bacteria (LAB) and the score of Gram (+/-) bacteria on the pellets that was made from agricultural industrial by-products and enriched with extract of vegetable's pickle as a source of lactic acid bacteria was conducted at the laboratory of Feed Technology, Fac. of Animal Science Diponegoro University, Semarang. The materials used were cassava, rice bran, cassava flour, pollard, molasses, and the extract of vegetable's pickle. Experiment was conducted by completely randomized design (CRD) within 3x2 factorial and 5 replications. The first factor is the level of molasses (0, 4 and 6%) and the second factor was incubation time (0 and 2 days). Score of Gram (+/-) bacteria and the total number of lactic acid bacteria were observed as parameter in this study. Data were analyzed using general linear method of SAS (GLM-SAS). Result of experiment showed that there was no significant effect on the interaction between the level of molasses treatment and incubation time to the score Gram (+/-) bacteria. However, partially the level of molasses and / or time of incubation significantly affect the total content of LAB. This can be understood from the score of Grams (+/-) bacteria that treatments can eliminate Gram negative bacteria. Moreover, molasses and incubation was able to maintain Gram positive bacteria which are also represented in the total number of LAB, i.e.: 5.8×10^6 CFU in 2 days incubation and 5.1×10^6 CFU at the level of molasses of 4%.

Keywords: molasses, incubation, pellet, lactic acid bacteria and gram bacteria

The Performance Inhibition of Ketohehexoses and Aldohehexoses in Lactoperoxidase Activity Assay

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ABSTRACT

LPOS (Lactoperoxidase System) has been used in food application as natural antibacterial due to its safety and broad spectrum of action. However, the reaction remained reactive oxygen species (ROS) that required to be scavenged. An investigation of D-allose, a natural radical scavenger, in LPO system seems to be needed. Our research also employed ketohehexoses and aldohehexoses. The performance of enzyme activity was also studied in Horseradish Peroxidase, Myeloperoxidase, and Xanthine Oxidase. Enzymes activity were determined spectrophotometrically. ABTS, guaiacol, and xanthine were used as substrate to measure enzyme activity. The remaining of [SCN⁻] and [H₂O₂] in the LPOS were calculated using ferric nitrate and ABTS, respectively. As results, ketohehexoses and aldohehexoses inhibited LPO activity at some degree. D-allose and L-fructose strongly only inhibited LPO activity. These sugar also inhibited decomposition of SCN⁻ and H₂O₂ in LPOS. Due to the strong inhibition of LPO activity by D-allose, it is noted that the utilization of D-allose to scavenge ROS might be performed after LPO treatment.

Keywords: Lactoperoxidase Activity, Ketohehexose, Aldohehexose, Inhibition.

Committee
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