July 7th , 2019

Hiasinta A. Purnawijayanti
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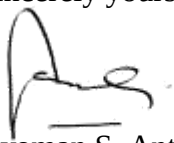
Dear Hiasinta A. Purnawijayanti,

This is to inform you that your abstract entitled "The probiotic potential and sensory characteristics of growol based noodles" has been accepted for poster presentation at the upcoming ASEAN Food Conference in Bali, Indonesia, October 15-18, 2019. Please submit full paper according to the format of the attached file before September 2, 2019.

We thank you for your support of the conference and your valuable contribution to its content. We look forward to seeing you in Bali.

Sincerely yours,



Nyoman S. Antara, Ph.D.
OC AFC 2019
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1.	Hiasinta A. Purnawijayanti, STP., MP	Dosen

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Hari: Selasa s/d Jumat
Tanggal: 15 -- 18 Oktober 2019
Acara: *ASEAN Food Conference 2019*
Tempat: Grand Bali Beach Hotel Sanur
Jalan Hang Tuah, Sanur, Denpasar, Bali

Surat tugas ini dibuat, untuk dipergunakan sebagaimana mestinya.

Yogyakarta, 14 Oktober 2019
Ketua,

Chatarina S. Widyastuti, M.Kep., Ns., Sp.Kep.MB

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Nama: Hiasinta A. Purnawijayanti, STP., MP
Kegiatan: *ASEAN Food Conference 2019*
Waktu: Selasa s/d Jumat, 15 -- 18 Oktober 2019

Penyelenggara,

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1) ***Arsip sekretariat (surat tugas & laporan menjalankan tugas asli)***
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This Certificate is Presented to :

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P-HN-60	**The effect of streaming and fermented processes on nutritive values, total phenolic contents and antioxidant activities of fermented tea (cha-miang)** *Amornrat Aursalung, Sirinapa Thangsiri, Uthawan Suttisansanee* Institute of Nutrition, Mahidol University, Putthamonthon 4 road, Salaya, Putthamonthon, Nakhon Pathom, Thailand 73170
P-HN-61	**Evaluation of antioxidant activity and phytochemicals of locally consumed plant foods from nueva ecija, Philippines** *Paolo Robert P. Bueno, Rachel Camille R. Cabrera, Gracia Fe B. Yu* Department of Biochemistry, UP Manila
P-HN-62	**Assessment of antioxidant profile and phytochemicals of locally consumed plant foods from Bicol, Philippines** *Paolo Robert P. Bueno, Rachel Camille R. Cabrera, Gracia Fe B. Yu* Department of Biochemistry, UP Manila
P-HN-63	**Sorghum (*sorghum bicolor* L. Moench) administration inhibits colon carcinogenesis through improvement of colon microenvironment** *[1]Nur Fathonah Sadek, [1]Endang Prangdimurti, [1]Fransiska Rungkat Zakaria, [2]Bambang Pontjo Priosoeryanto* [1] Department of Food Science and Technology, Bogor Agricultural University, Bogor [2] Division of Veterinary Pathology, Department of Veterinary Clinic, Reproduction and Pathology, Bogor Agricultural University, Bogor
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P-HN-65	**The probiotic potential and sensory characteristics of growol based noodles** *Maria Amrijati Lubijarsih and Hiasinta A. Purnawijayanti* Department of Nutrition, Pantirapih School of Health Sciences, Jl. Tantular 401, Pringwulung, Condongcatur, Depok, Sleman, Yogyakarta, Indonesia
P-HN-66	**Preparation and characterization of green and roasted coffee extract-loaded chitosan nanoparticles by ionic gelation method** *Puspita Sari, Kristina Lois, Kun Tanti Dewandari, Maria Belgis, Mahriani* Department of Agricultural Product Technology, Faculty of Agricultural Technology, University of Jember, Indonesia
P-HN-67	**Comparative analysis of edible oils in Myanmar market** *Phyo Thura Htay, Zaw Lay Win* Yangon Technological University

THE PROBIOTIC POTENTIAL AND SENSORY CHARACTERISTICS OF GROWOL- BASED NOODLES

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01 INTRODUCTION AND MOTIVATION

1. Growol is a traditional Indonesian fermented food based on cassava and has a sour taste. growol is generally consumed as a substitute for rice.
2. Growol processing through Lactic Acid Bacteria (LAB) fermentation process, especially *Lactobacillus casei* subsp rhamnosus TGR 2 thus growol has the potential as functional food source of probiotics and the prebiotics.
3. The process of making growol by soaking cassava . Soaking process will modify the cassava cells and cause changes in characteristics are needed to produce good quality noodles.
4. The level of consumption and production of growol tends to decrease . Growol noodles are one of the innovative products from growol that have the potential to be developed.
5. The processing of noodles growol needs to be made in such a way that noodle growol is attractive for consumption and its potential as functional probiotic food can be maintained.
6. The aim of this study is to develop growol-based noodles and observe its sensory characteristics and probiotics potential.

CASSAVA

GROWOL

02 MATERIALS AND METHODS

MATERIALS

1. Growol, tapioca, skim milk powder, table salt, and carrot extract. Wheat flour are used as control noodles.
2. The main equipment used is manual pasta machine, cooking equipment, equipment for testing bacterial counts, and organoleptic/sensory testing equipment.

METHODS

1. Growol noodles formula
   (Growol 100%, skim milk powder : 0%,5%,10%, tapioca 15%. table salt 1%, carrot extract 5%)
2. Growol Noodles Proccessing

1

Growol, starch, salt, skim milk, carrot

2

MIXING

3

PRESSING, 2 mm thick

4

STEAMING, 30 min

5

CUTTING

6

SOAKING, 1 min (1 tablespoon oil/250 ml boiled water)

7

Fresh Growol Noodles

3. Evaluation of growol noodles
   a. Sensory evaluation and preference test (Appearance, texture, taste, overall preference) Scoring Methods, ANAVA,DMRT Method
   b. Level of probiotics (LAB):
   MRSA Method,TPC Methods

03 RESULTS AND DISCUSSION

GROWOL NOODLES FORMULATION

1. Growol Noodles: Growol 100 g, Tapioca 15 g, Skim milk powder 0%, 5%, 10%, Table Salt 1 g, Carrot extract 5 g
2. Wheat Noodles as control: Wheat flour 100 g, Table salt 1 g, Carrot extract 5 g

Growol Noodles 0% skim milk

Growol Noodles 5% skim milk

Growol Noodles 10% skim milk

Wheat noodles

SENSORY CHARACTERISTICS EVALUATION

1. Chewiness: There was no significant difference in chewiness of growol noodle samples with or without the addition of skim milk.
2. Flavor: Growol flavor still detectable, from moderate to strong, in growol noodles.
3. Appearance: Growol noodles with addition 5 and 10% skim milk had no significant difference in appearance with wheat noodles.
4. Overall preference:
   a. The three growol noodles samples showed no significant differences in overall preference;
   b. The growol noodles sample with the addition of 10% skim milk had the highest preference score and was not significantly different from wheat tnoodles

THE NUMBER OF LACTIC ACID BACTERIA

1. Growol: 4,70 x 10^3 CFU/g
2. Growol Noodles: 2,49 x 10^6 CFU/g

- Lactic acid bacteria in growol can relatively survive during the process of making noodles so that it is expected that when growol noodles were consumed could be a probiotic source.

04 CONCLUSION

1. The growol noodles sample with the addition of 10% skim milk had the highest preference score and was not significantly different from wheat flour noodles
2. The level of lactic acid bacteria in growol noodle is 2,49 x 106 cfu/g sample
3. Growol noodles have the potential as functional foods of probiotics.

ACKNOWLEDGMENTS

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The probiotic potential and sensory characteristics of *growol* based noodles

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Abstract

Growol is an Indonesian traditional food that is naturally fermented by various types of bacteria. *Lactobacillus casei* subsp rhamnosus TGR 2 contained in growol is a probiotic, which is important in maintaining intestinal health and preventing diarrhea. The lack of growol innovation decreases the consumption level and production. We use growol as a basic ingredient for making noodles.

Three types of noodles with growol base ingredient were variously made by adding skim milk (0, 5 and 10%), 5% carrots to improve the color and 15% cassava starch as filler. Flour based noodles was used as control. Sensory evaluation of the appearance, texture, flavor and preference of the four noodles was carried out. Noodles with best sensory properties were tested for its probiotic potential by counting the number of lactic acid bacteria

The sensory score of growol noodles was generally slightly lower than control. The appearance score of growol noodles was rather interesting; the texture was rather chewy; the growol taste was rather strong; and the overall preference was quite preferred. Moreover, the growol noodle sample with the addition of 10% skim milk had the highest preference score. The levels of lactic acid bacteria in growol noodles with the addition of 10% skim milk was 2.49 x 10^6 CFU/gr. This implied that growol noodles has the potential as a food source of probiotics.

Growol can be processed into noodles with quite good sensory characteristics, which are quite attractive, chewy, the taste is quite strong and preferred. Growol noodles potentially become a probiotic functional food.

Keywords: Growol, Noodles, Probiotic, Sensory characteristics

Introduction

Growol is a traditional fermented food made from cassava and has a sour taste. This type of food is only made in Yogyakarta area, especially Kulon Progo and the surrounding area. The process of making growol by soaking cassava which has been peeled and sliced into small pieces in water for 4 days, then drained and crushed before steamed. Soaking process will modify the cassava cells and cause changes in characteristics i.e increased viscosity (adhesive power), gelation ability (gel forming), rehydration power (ability to absorb water), and solubility (ability to dissolve) so that in the form of flour growol has a better texture than tapioca flour or ordinary cassava flour without fermentation process. These characteristics are needed to produce good quality noodles.

Growol as a traditional fermented food has the potential to contain probiotics. Some lactic acid bacteria that have the potential as probiotics have been isolated from growol.

Probiotic bacteria isolated from growol *(Lactobacillus casei subsp. Rhamnosus TGR2*) are able to survive in acidic conditions in the digestive tract, withstand in the concentration of bile salts, and have the potential for antimicrobial activity, i.e. inhibits growth of *Staphylococcus aureus*, *S. typhimurium*, *E. coli*, *Bacillus cereus*, and *Morganella morganii,* and produces bacteriocin-like compounds also (Nuraida, 2015) Kanetro (2015) showed that the steaming and drying process did not completely destroy lactic acid bacteria on growol. The aim of this study is to develop growol-based noodles and observe its sensory characteristics and probiotics potential

Materials and Methods

Growol, tapioca, skim milk powder, table salt, and flour were purchased at local market. Carrot extract were used for noodle natural coloring. The main equipment used is manual pasta machine, cooking equipment, equipment for testing bacterial counts, and organoleptic/sensory testing equipment. Three types of growol noodles were made with different skim milk added (0, 5 and 10%). Flour noodles are used as controls.

Growol noodles are made through the following stages (i) Mix the growol which has been mashed with tapioca, skim milk and table salt and knead (ii) Add carrot extract, continue knead dough until smooth (iii) Roll out the dough using a pasta machine until 2 mm thick smooth sheets are obtained (iv)Wrap noodle sheets in plastic and steam for 30 minutes, then cooled (v) Cut sheet of noodles into 1 cm width noodles strands (vi) Put noodle strands into boiled water that has been added with cooking oil (1 tablespoon oil / 250 ml water) for 1 minute (vii) Noodle strandsare lifted and drained.

Sensory characteristics evaluation conducted using 30 untrained respondents. Panelis evaluate growol noodles by color, texture, taste and overall preference using scoring methods.Data were analyzed by analysis of variance, and differences between samples were tested by DMRT (Gomez and Gomez, 1995). The most preferred growol noodles were then observed for the growth of lactic acid bacteria and calculated using the total plate count (TPC) method.

Results and Discussion

Growol noodle formulation

Growol noodle formulation applied in this research presented in the table 1.

Table 1. Growol Noodle Formulation

Growol Noodles	Wheat Noodles as control
Growol 100 g	Wheat flour 100 g
Tapioca 15 g	-
Skim milk powder 0-30 g	-
Table salt 1 g	Table salt 1 g
Carrot extract 5 g	Carrot extract 5 g

According to preliminary study result, addition of tapioca less than 15% would produce wet dough so as noodles cannot be formed. Meanwhile, addition of tapioca

above 15% produce brittle dough and growol noodle strands tends to disintegrate upon heating process. Tapioca serves as filler, skim milk powder functions also as filler as well as to increase levels of protein in noodles, while carrot extract serves as a natural coloring and source of carotene (provitamin A).

Sensory characteristics evaluation

Evaluation of sensory characteristics was carried out using panelists/respondents who provide an assessment through a difference test and preference test. Differentiation tests include texture/chewiness and flavor, while preference tests include overall appearance and likeness. Sensory test results are shown in table 2.

Table 2. Growol Noodles Sensory Characteristics Test Result

Sensory Atributes	**Sample**			
	Wheat noodles	Growol Noodles without Skim milk added	Growol Noodles with 5% skim milk added	Growol Noodles with 10% skim milk added
Difference Test Scores*)				
Texture/Chewiness	3,03 (a)	2,34 (b)	2,38 (b)	2,31 (b)
Flavor	1,59 (b)	2,55 (a)	2,07 (ab)	2,52 (a)
Preference Test Scores*)				
Appearance	3,07 (a)	2,28 (b)	2,59 (ab)	2,59 (ab)
Likeness	3,07 (a)	2,38 (bd)	2,39 (cd)	2,52 (ad)

*) Average score by 30 panelists

In same row, number followed by same alphabet in parenthesis have no significantly difference at $p \geq 5\%$

Score Value

Score	Texture/Chewiness	Growol Flavor	Appearance	Overall Likeness
1	Brittle	Barely detectable	Not attractive	Not like
2	Slightly chewy	Moderate	Moderate	Slightly like
3	Chewy	Strong	Attractive	Like

4.	Very chewy	Very strong	Very attractive	Very like

Chewiness was an important quality attribute of noodles. In wheat noodles, its chewiness was mainly determined by the formation of gluten. Growol and its basic ingredients, cassava, have no gluten. Therefore it can be understood if the chewiness score of growol noodles is lower than wheat noodles. Chewiness in growol noodles basically was determined by its starch properties,which undergo changes during the soaking process in growol making. Soaking process will modify the cassava cells and cause changes in characteristics i.e increased viscosity (adhesive power), gelation ability (gel forming), rehydration power (ability to absorb water), and solubility (ability to dissolve).

These changes cause growol noodles to have a pretty chewy texture, although not as chewy as noodles from wheat flour. Acoording to research conducted by Putri, et al (2012) fermented and lactic acidified starches required a longer time to reached their lower peak viscosity than the native starch. The decrease in crystallinity was attributed to the depolymerization of starch structure, resulting in a weakened granule organization. Our result was in line with Li, et al (2019) which showed that fermentation disrupted rice ordered structures (e.g., starch crystallites) and broke starch granules, which was preferable for the swelling and molecule leaching of rice noodle matrixes with enhanced molecule interactions. Such noodle matrixes were robust to resist imposed force, thus exhibiting increased hardness, chewiness and mouthfeel.

There was no significant difference in chewiness of growol noodle samples with or without the addition of skim milk.Thus milk protein has no effect on growol noodles chewiness.

Growol flavor still detectable, from moderate to strong, in growol noodles. the dominant flavor in growol was sour. Along soaking process, lactic acid bacteria grew and carried out fermentation process. The fermentation changes the organoleptic characteristics of foods through developing a wide diversity of flavors and aromas. LAB ferment carbohydrates to almost entirely lactic acid (homofermentation) or to a mixture of lactic acid, carbon dioxide and acetic acid and/or ethanol (heterofermentation). Other compounds, such as diacetyl, acetaldehyde and hydrogen peroxide, are also produced. These compounds contribute to the growol flavor (Nuraida, 2015). Growol flavor subsequently were still carried away in growol noodles

There was no significant difference in appearance of growol noodle samples with the addition of skim milk. The appearance value are between moderate attractive and attractive. Growol noodles with addition 5 and 10% skim milk had no significant difference with wheat noodles. Growol itself had pale and dull white appearance. The use of carrot extract in growol noodle formula contributes to the color yellow, so as can improve the appearance of growol noodles.

The three growol noodles samples showed no significant differences in overall preference, although their score were lower than wheat noodle. The overall preference level of growol noodle samples with 10% skim milk added was not significantly different from wheat noodles. Thus, growol noodles with 10% skim milk addition was the most liked sample and would be tested for its potential as a probiotic source.

The number of lactic acid bacteria, both on the growol and the most preferred growol noodles was observed. The result shown in Table 3.

Table 3. Number of LAB in growol and growol noodles

Sample	Number of LAB (CFU/g)
Growol	$4{,}70 \times 10^3$
Growol Noodles	$2{,}49 \times 10^6$

Table 3 shows an increase in the number of lactic acid bacteria in growol noodles compared to growol. This is probably due to the fact that after the growol was steamed there was a pause for the cutting process of the noodles and soaking noodles strands in water before growol noodles were measured for its LAB number. LAB had enough time to grow and multiply. Different results were shown in Kanetro (2015), which observed the number of lactic acid bacteria in growol that was processed into oyek (dried growol). This study shows that both steaming and drying processes reduce the amount of BAL in oyek.

Lactic acid bacteria in growol can relatively survive during the process of making noodles so that it is expected that when growol noodles were consumed could be a probiotic source.

Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of this paper

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