

01. Characterization of Soyghurt Synbiotic Drink From Soymilk and Purple Yam Extract

by Rosida Rosida

Submission date: 12-Jan-2021 11:03AM (UTC+0700)

Submission ID: 1486132079

File name: 01._characterization_of_soyghurt_synbiotic.pdf (692.18K)

Word count: 2520

Character count: 12274

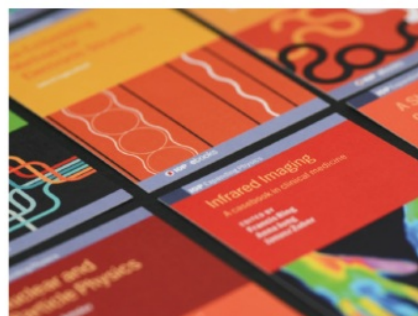
PAPER • OPEN ACCESS

Characterization of Soyghurt Synbiotic Drink From Soymilk and Purple Yam Extract

1

To cite this article: Rosida *et al* 2020 *J. Phys.: Conf. Ser.* **1569** 032014

View the [article online](#) for updates and enhancements.

**IOP ebooks™**

Bringing together innovative digital publishing with leading authors from the global scientific community.

Start exploring the collection—download the first chapter of every title for free.

Characterization of Soyghurt Synbiotic Drink From Soymilk and Purple Yam Extract

Rosida¹⁾, E Amalia, E¹⁾ and S Djajati¹⁾

¹⁾Food Technology Departement, Engineering Faculty, UPN Veteran East java

Abstract. The production of synbiotic drink from soy milk and water am filtrate had been studied. Synbiotic is a combination of probiotic and prebiotic components. Synbiotic product is usually found on fermented drink product, such as soyghurt. Prebiotic components of water yam, such as soluble dietary fiber and Inulin, can stimulate selective growth activity of lactic acid bacteria of fermented drink. The aim of this study is to develop diversivly healthy drink based on locally food resources. This research used Completely Randomized Design with factorial pattern cosisted of 2 factors and 2 replications. Factor 1 is the proportion of soymilk:water yam extract (50:50, 60:40, and 70:30) and Factor 2 is the addition of skim milk (5%, 7.5% and 10%). The observed data were analyzed by Analysis of Variance, and if there are significant differences, the data were analyzed by Duncan's Multiple Range Test. The study revealed that the best treatment is the proportion soymilk:water yam extract (50:50) and 10% of skim milk addition, which produced synbiotic drink with total lactic acid bacteria 10.44 log CFU/ml, pH 4.11, lactic acid content 1.18%, soluble protein content 0.78%, and soluble dietary fiber content 0.21%,

Key words: soyghurt, synbiotic, soy milk, water yam extract, skim milk

1. Introduction

Water yam (*Dioscorea alata*) is a local food crops which can prospectively be used as the source of functional food. Water yam contains soluble dietary fiber, such as Inulin, which can be fermented by the gut bacteria and and has good influiced to human helath, so that water yam can be classified as probiotic component. Purple water yam had 7.45% Inulin content [1] and 13,54% dietary fiber content [2].

Hsu et al. [3] said that conumption of water yam is useful for the health of gut microflora and can act as antioxidant agent in the oxidative process. The research showed that water yam consumption could increase the amount of good colony bacteria significantly (such as Bifidobacteria and Lactobacillus). These bacteria could inhibit the growth of pathogenis bacteria and decrease the risk of carcinogenic agent.

Synbiotic is a combination of pobiotic and prebitoc components. Both components are related each other, which prebiotic component selectively gave nutrition to probiotic bacteria, so that stimulated the growth of probiotic bacteria in the gut mucosa [4]. At the market, there is emerging many synbiotic product. The benefit of probiotic and prebiotic combination is accelerating life force of probiotic because the specific substrate had been available for fermentation. Beside that, human being could get



¹Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](#). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

Published under licence by IOP Publishing Ltd

the benefit from both components. The application of synbiotic concept was often found in fermented drink products [5]

Soyghurt is a fermented product of soymilk that used *Streptococcus thermophilus* and *Lactobacillus bulgaricus* which are generally used in yoghurt production [6]. In the soyghurt production can be diversified by using lactic acid bacteria which has probiotic characteristic such as *Lactobacillus acidophilus*, in order to improve the balance of gut microflora.

Soymilk had high nutritive value, especially because of its protein content, besides fat, carbohydrate, calcium, phosphor, Iron, Provitamin A, Vitamin B and water [7]. The important thing which must be considered in soyghurt production is the kind of carbohydrate in soy milk is different from that in the cow milk [8]

The consistency of soyghurt is usually thinner, so that it needed additive thickener agent, such as skim milk [9]. Skim milk had all nutritive components of milk, except fat and soluble fat vitamin. The addition of skim milk is used to increase total solid non fat, to improve consistency and viscosity and to have a role in the coagulation process [10]. Soymilk do not contain lacose, so that it cannot be used as the source of Carbon and Energy for starter bacteria. So that it needed addition of sugar into soy milk before it is fermented by lactic acid bacteria. The addition of simple sugar such as glucose and lactose in soymilk can increase acid production by lactic acid bacteria [11].

The objective of this study is to find the best treatment between the proportion of soymilk:water yam extract and the addition of skim milk in order to make soyghurt synbiotic drink.

2. Methods

The materials used in this research were soy milk, skim milk, water yam, sucrose, water, bacteria starter (*Streptococcus thermophilus*, *Lactobacillus bulgaricus* and *Lactobacillus acidophilus* FNCC0051) from VPH laboratory Airalngga University; MRS broth, MRS agar, aquadest, and chemical reagen for analysis. The laboratory devices used in this research were autovlave, inoculation case, incubator, water bath, pH meter, analytical balance, micropipet, vortex, blender and glassware for chemical analysis.

This research used Completely Randomized Design with factorial pattern cosisted of 2 factors and 2 replications. Factor 1 is the proportion of soymilk:water yam extract (50:50, 60:40, and 70:30 respectively) and Factor 2 is the addition of skim milk (5%, 7,5% and 10% respectively). The observed data were analyzed by Analysis of Variance, and if there are significant differences, the data were analyzed by Duncan's Multiple Range Test (DMRT). The research procedure was shown on Fig 1.

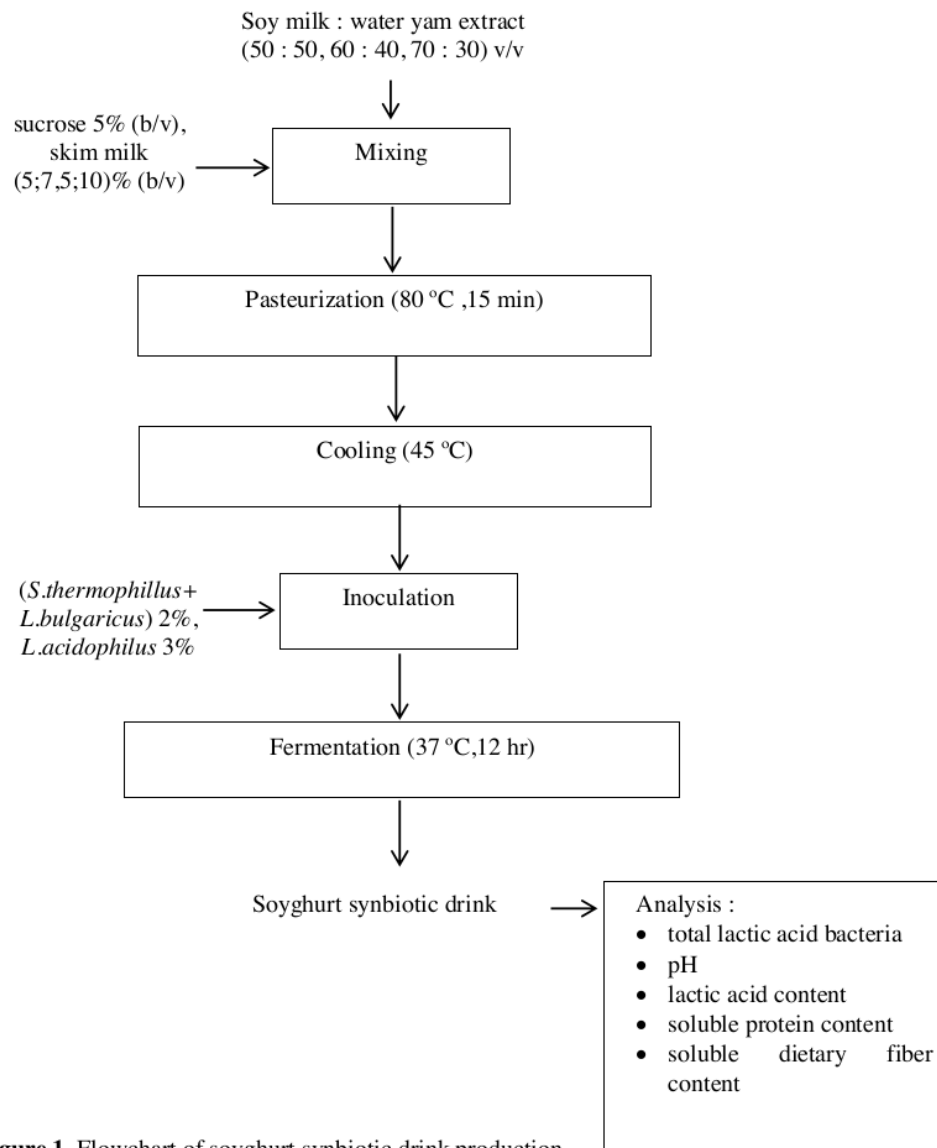


Figure 1. Flowchart of soyghurt synbiotic drink production

3. Results

Total of Initial Lactic Acid Bacteria

Initial analysis of total Lactic acid bacteria is done to know initial amount of bacteria which will be used in the fermentation process and it is shown on Table 1.

Table 1. Total Lactic Acid Bacteria from initial bacteria starter

Sampel	Total BAL (Log CFU/ml)
<i>Lactobacillus acidophilus</i>	7.39
<i>S. thermophilus</i> dan <i>L. bulgaricus</i>	7.36

Table 1 revealed that initial starter of *Lactobacillus acidophilus* was 7.39 CFU/ml and the mixture of *S. thermophilus* dan *L. Bulgaricus* was 7.36 log CFU/ml. This results were appropriate with SNI (2981:2009) standard of minimally lactic acid bacteria, that is 107 CFU/ml.

Total Lactic Acid Bacteria

Table 2. Total Lactic Acid Bacteria of soyghurt synbiotic drink

Treatment		Total Lactic Acid Bacteria (log CFU/ml)	DMRT (5%)	Notasi
Soy milk: water yam extract	Soy milk: water yam extract			
50 : 50	5	8.41 ± 0.013	0.04	c
50 : 50	7.5	9.33 ± 0.024	0.04	e
50 : 50	10	10.44 ± 0.028	0.04	h
60 : 40	5	8.12 ± 0.010	0.03	b
60 : 40	7.5	9.01 ± 0.011	0.04	d
60 : 40	10	10.12 ± 0.009	0.04	g
70 : 30	5	7.42 ± 0.011	-	a
70 : 30	7.5	8.44 ± 0.001	0.04	cd
70 : 30	10	9.42 ± 0.008	0.04	f

*the scores followed by different letters mean significantly different ($p \leq 0,05$)

Table 2. showed total lactic acid bacteria (LAB) of soyghurt synbiotic drink were about 7.42 - 10.44 log CFU/ml. According to Gustawa *et al.* [13], the activity of LAB accelerated when it is added by prebiotic components. Prebiotic components of water yam could stimulate the growth of prebiotic bacteria, so that it increased the amount of LAB [5]. Sintasari *et al.* [14] stated that skim milk contained high protein and lactose, and most of it would be changed into lactic acid by LAB. So that the higher protein added into the media, the higher total amount of LAB.

5 pH and Lactic Acid content

Table 3. pH and Lactic acid content of soyghurt synbiotic drink

Treatment		pH	Lactic acid content (%)
Soy milk: water yam extract	Skim milk (%)		
50 : 50	5	4.32 ± 0.007g	0.94 ± 0.006c
50 : 50	7.5	4.23 ± 0.007d	1.05 ± 0.006f
50 : 50	10	4.11 ± 0.014a	1.18 ± 0.006i
60 : 40	5	4.37 ± 0.014h	0.87 ± 0.006b
60 : 40	7.5	4.27 ± 0.007e	0.99 ± 0.019e
60 : 40	10	4.16 ± 0.007b	1.12 ± 0.006h
70 : 30	5	4.43 ± 0.000i	0.79 ± 0.013a
70 : 30	7.5	4.30 ± 0.007f	0.96 ± 0.006d
70 : 30	10	4.19 ± 0.007c	1.07 ± 0.000g

*the scores followed by different letters mean significantly different ($p \leq 0,05$)

Table 3 indicated that soyghurt synbiotic drink had pH 4.11-4.43 and total lactic acid 0.79-1.18%. Aini *et al* [14] stated that lowering pH is a result of fermentation process because of lactic acid accumulation as a main product of LAB activity. Lactic acid is the most acid component which is produced in the yoghurt fermentation. Ph level is inversly propotional to lactic acid content. The more lactic acid content yield, the lower pH level of the product [15].

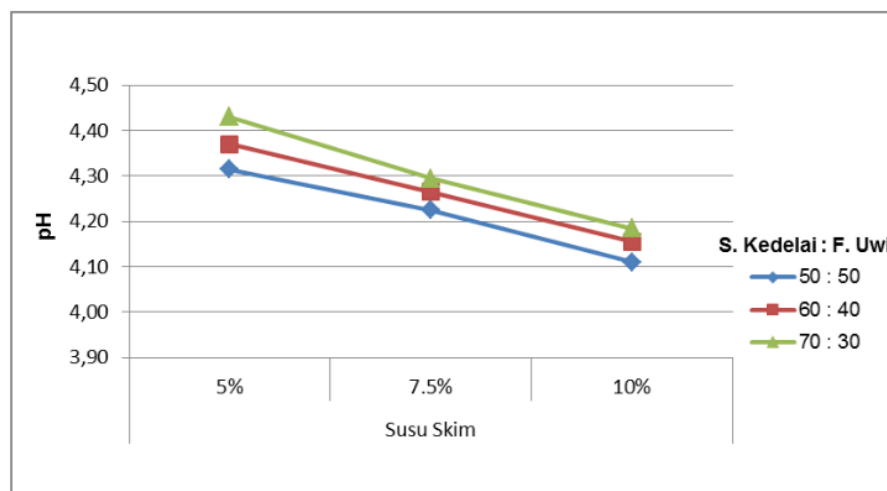
In accordance with Herawati *et al.* [16] who stated that the more skim milk concentration, would increase lactose level in the media and accelerated the activity of bactria in changing lactose into lactic acid. Dietary fiber also be fermented by LAB and produced lactic acid and short chain fatty acid (acetate, butyrate and propionate. [17]

Soluble protein and soluble dietary fiber content

Table 4. Soluble protein and soluble dietary fiber content of soyghurt synbiotic drink

Treatment		soluble protein content (%)	soluble dietary fiber content (%)
Soy milk: water yam extract	Skim milk (%)		
50 : 50	5	$0.62 \pm 0.007c$	$0.23 \pm 0.014c$
50 : 50	7.5	$0.68 \pm 0.007e$	$0.20 \pm 0.007c$
50 : 50	10	$0.78 \pm 0.007g$	$0.17 \pm 0.014bc$
60 : 40	5	$0.58 \pm 0.007b$	$0.22 \pm 0.021c$
60 : 40	7.5	$0.65 \pm 0.014d$	$0.16 \pm 0.014b$
60 : 40	10	$0.74 \pm 0.007f$	$0.14 \pm 0.007b$
70 : 30	5	$0.55 \pm 0.007a$	$0.21 \pm 0.007c$
70 : 30	7.5	$0.63 \pm 0.000cd$	$0.13 \pm 0.021ab$
70 : 30	10	$0.69 \pm 0.007ef$	$0.10 \pm 0.007a$

*the scores followed by different letters mean significantly different ($p \leq 0,05$)



Tabel 4 showed that soyghurt synbiotic drink had 0.55% - 0.78% of soluble protein content and 0.13%-0.23% soluble dietary fiber content. Hassan *et al* [18] stated that soluble protein content is lated with proteolytic activity of LAB which changed protein (casein) into amino acid and peptida, so that it would increased soluble protein content of yoghurt. Satrter LAB produced proteolytic enzyme that

induced protein was hydrolized into simple protein components, such as peptides and amino acid, which constituted soluble protein content. [19].

Water yam had soluble dietary fiber content which could be used as prebiotic agent [5]. The utilization of soluble dietary fiber content would accelerate with the increase of total BAL. The decline of soluble dietary fiber content was influenced by total LAB. The higher total LAB, the utilization of dietary fiber as substrate is greater [20].

4. Conclusion

the best treatment is the proportion soymilk:water yam extract (50:50) and 10% of skim milk addition, which produced synbiotic drink with total lactic acid bacteria 10.44 log CFU/ml, pH 4.11, lactic acid content 1.18%, soluble protein content 0.78%, and soluble dietary fiber content 0.21%. the further analysis showed that the drink had 3.01% of fat content, 0.99% of ash content and 3.35% of protein content which is fulfilled the requirement of SNI (2981:2009) for quality standard of fermented drink.

References

- [1] Winarti S, Harmayani E, and Nurismanto R 2011 *J. Agritech* **31**(4) 378
- [2] Supriyasa, Harijono, Estiasih T and Sriwahyuni E 2016 *Int. J. of Food Properties* **19**(8) 1659
- [3] Hsu C C, Huang Y C, Yin M C, and Lin S J 2006 *J of Food Sci.* **71**(7)513.
- [4] Hamed N, Susan J, and Reza I 2012 *World Journal of Fish and Marine Sciences* **4**(1) 65.
- [5] Adriani L 2010 *Probiotik Basis Ilmiah, Aplikasi, dan Aspek Praktis*, Widya Padjadjaran : Bandung, 2010
- [6] Rahma D R 2011 *Mengolah Kedelai Sehat dan Mudah Klaten*: Cempaka Putih
- [7] Yusmarini and Efendi R 2004 *J. Natur Indonesia* **6**(2)104
- [8] Koswara S 1995 *Teknologi Pengolahan Kedelai* Jakarta : Sinar Harapan
- [9] Rahman A, Fardiaz S, Rahayu W P, Suliantari, and Nurwitri C C 1992 *Teknologi Fermentasi* 4th ed. Pusat Antar Universitas. Bogor : Institut Pertanian Bogor
- [10] Copeland R A 1994 *Methods For Protein Analysis* New York: Chapman and Hall pp.39-55
- [11] Setioningsih E, Setyaningsih R, and Susilowati 2004 *J. Bioteknologi* **1**(1) 1
- [12] Gustaw W, Kordowska-Wiater M, and Koziol J 2011 *Polymer Technology* **10**(4) 455
- [13] Sintasari R A, Kusnadi J, and Ningtyas D W 2014. *Jurnal Pangan dan Agroindustri* **2**(3) 65
- [14] Aini N, Prihananto V, Wijonarko G, Arimah A, and Syaifudin M 2017 *J. Agritech* **37**(2) 65
- [15] Faridhi K K A, Lungani A T, and Kusdiyantini E 2013 *J. Bioma* **15**(2) 64
- [16] Herawati D A and Wibawa D A A 2009 *J. Ilmiah Teknik Lingkungan* **1**(2)
- [17] James G L, Gropper, Sareen S and Smith J L 2005 *Advanced Nutrition and Human Metabolism*, 4th ed. USA: Wordworth, a Division of Thomson Learning Inc pp.301-315
- [18] Hasan A and Amjad I 2010 *African J. of Microbiology Research* **4**(1) 022.
- [19] Chairunnissa H, Balia R L, Pratama A, and Hadiat R D 2017 *J. Ilmu Ternak* **17**(1)
- [20] Rahmawati I S, Zubaidah E and Saparianti E 2015 *J. Aplikasi Teknologi Pangan* **4**(4)

01. Characterization of Soyghurt Synbiotic Drink From Soymilk and Purple Yam Extract

ORIGINALITY REPORT

11%	%	%	11%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Universitas Trunojoyo Student Paper	9%
2	Submitted to Acadia University Student Paper	1%
3	Submitted to RMIT University Student Paper	1%
4	Submitted to University of Akureyri Student Paper	<1%
5	Submitted to National University of Singapore Student Paper	<1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		