

Determination of Temperature and Fermentation Time for Production of Yoghurt Using Single Culture of *Lactobacillus* *rhamnosus* SKG34

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INTRODUCTION

FUNCTIONAL FOOD



- functional food is growing rapidly
- food consumed is expected not only to meet nutritional needs, but also can stimulate one of the special functions in individual health



LACTIC ACID BACTERIA



- LAB have been widely used by the food industry in creating functional food products to maintain the health of the human digestive tract
- Probiotics are living microorganisms which when given in the right amount can be beneficial for the health of the digestive tract.



PROBIOTIC



- Previously, the consumption of probiotics intended to modulate and improve the intestinal microbial balance
- recently, the probiotic strain has been developed to respond to specific physiological targets.



One food product that contains probiotics is yogurt

Conventional
Yoghurt

- Yoghurt is a product obtained from fermentation of milk by using the bacteria *Lac. bulgaricus* and *S. thermophilus*.
- *Lac. bulgaricus* and *S. thermophilus*, do not have the ability to survive through the intestinal tract and consequently do not play a role in the human intestine.

Bio-yogurt

Modern yogurt products are usually added with lactic acid bacteria which have beneficial properties to add benefits to yogurt

Lac. rhamnosus
SGK34

- A lactic acid bacteria isolated from Sumbawa horse milk has the potential as a probiotic.
- The potential of *Lac. rhamnosus* SGK34 has been tested both in vitro and in vivo.
 - have resistance to the condition of the digestive tract
 - has an enzyme bile-salt hydrolase
 - have functional properties reduce blood cholesterol levels



Some factors that influence the life of probiotic bacteria in fermented milk products :

- Strain type
- temperature and fermentation time
- milk solids content
- culture conditions
- final acidity
- nutrient availability
- concentration of sugar
- number of inoculums

Lac. rhamnosus
SKG34



Lac. rhamnosus SKG34 can be used as a single starter in yogurt production, but the factors that influence the survival of this bacteria need to be estimated so that it can produce yogurt with good characteristics.

Objective

The purpose of this study was to determine the exact temperature and fermentation time that can produce yogurt with good characteristics by using *Lactobacillus rhamnosus* SKG 34 as a single starter

RESEARCH METHODS

The research subjects:

Lactobacillus rhamnosus SKG34 which is a native Indonesian probiotic strain isolated from Sumbawa horse milk which is a collection of Integrated Laboratory for Bioscience and Biotechnology, Udayana University

This study consisted of 2 treatments, that are temperature and fermentation time:

Temperature of Fermentation (S) consists of 4 levels:

S1 = 41°C

S2 = 42°C

S3 = 43°C

S4 = 44°C

The duration of fermentation consisting of 5 levels:

W1 = 15 hour

W2 = 16 hour

W3 = 17 hour

W4 = 18 hour

W5 = 19 hour

The study was repeated 2 times so that 40 units of experiments were obtained.

OBSERVED VARIABLES

1. Lactic Acid Bacteria (Fardiaz , 1993)
2. pH
3. Total Lactic Acid (Sudarmaji, *et.al.*, 1997)
4. Yogurt sensory (SNI 2981:2009):
 1. appearance
 2. Smell
 3. Taste
 4. Consistency

RESULT

1. Yogurt sensory

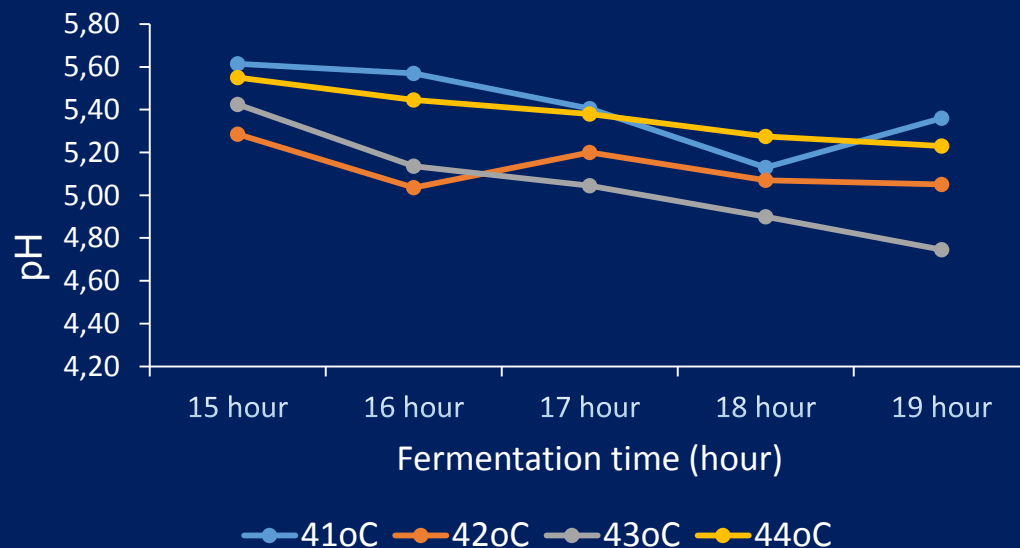
Yogurt sensory	fermentation time	temperature			
		41°C	42°C	43°C	44°C
appearance	15 hour	abnormal	abnormal	abnormal	normal
	16 hour	abnormal	abnormal	abnormal	normal
	17 hour	abnormal	abnormal	abnormal	normal
	18 hour	abnormal	abnormal	normal	normal
	19 hour	abnormal	normal	normal	normal
aroma	15 hour	Aroma of milk	Aroma of milk	specific yogurt	Aroma of milk
	16 hour	Aroma of milk	specific yogurt	specific yogurt	Aroma of milk
	17 hour	Aroma of milk	specific yogurt	specific yogurt	Aroma of milk
	18 hour	Aroma of milk	specific yogurt	specific yogurt	specific yogurt
	19 hour	Aroma of milk	specific yogurt	specific yogurt	specific yogurt
taste	15 hour	taste milk	taste milk	taste milk	taste of milk
	16 hour	taste milk	taste milk	taste milk	taste milk
	17 hour	taste milk	taste milk	sour taste / specific yogurt	taste milk
	18 hour	taste milk	sour taste / specific yogurt	sour taste / specific yogurt	taste milk
	19 hour	taste milk	sour taste / specific yogurt	sour taste / specific yogurt	sour taste / specific yogurt
Consistency	15 hour	inhomogeneous	inhomogeneous	inhomogeneous	inhomogeneous
	16 hour	inhomogeneous	inhomogeneous	inhomogeneous	inhomogeneous
	17 hour	inhomogeneous	inhomogeneous	inhomogeneous	inhomogeneous
	18 hour	inhomogeneous	inhomogeneous	homogeneous	inhomogeneous
	19 hour	inhomogeneous	homogeneous	homogeneous	inhomogeneous

2. Acidity (pH)

The average pH value of yogurt at different fermentation times and temperatures

Fermentat ion times	temperature			
	41°C	42°C	43°C	44°C
15 hour	5,62	5,29	5,43	5,55
16 hour	5,57	5,04	5,14	5,45
17 hour	5,41	5,20	5,05	5,38
18 hour	5,13	5,07	4,90	5,28
19 hour	5,36	5,05	4,75	5,23

Yogurt pH is
generally 4.5



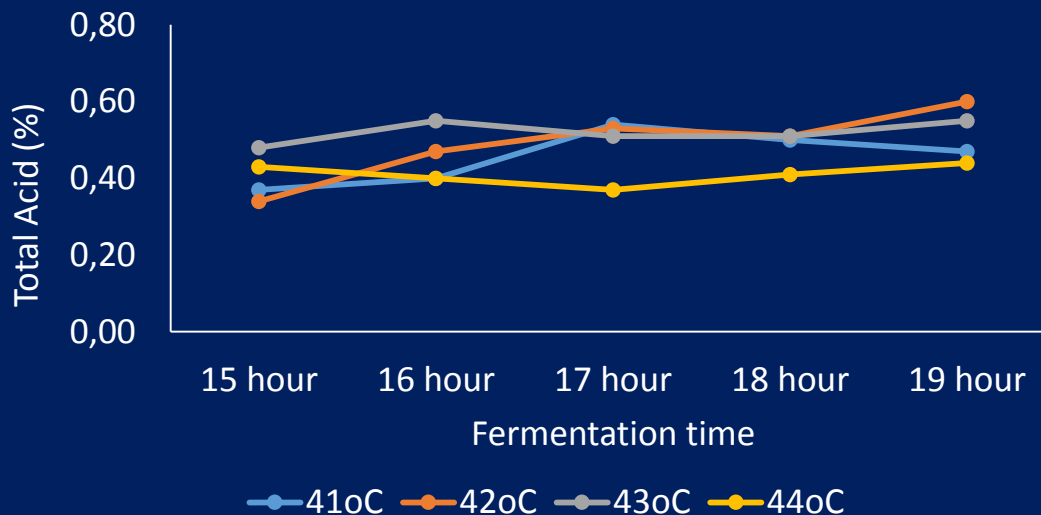
Increased of fermentation
temperature and time
lowering the pH of
yoghurt

3. Total Acid (%)

The average value of total acid yogurt at different fermentation temperatures and times

Fermentation times	temperature			
	41°C	42°C	43°C	44°C
15 hour	0,37	0,34	0,48	0,43
16 hour	0,40	0,47	0,55	0,40
17 hour	0,54	0,53	0,51	0,37
18 hour	0,50	0,51	0,51	0,41
19 hour	0,47	0,60	0,55	0,44

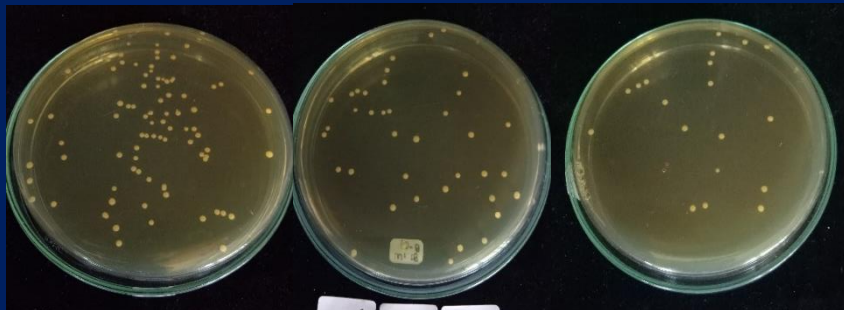
Total acid of yogurt according to SNI is
0.5 - 2%



increasing temperature
and fermentation time
increase total acid in
yogurt

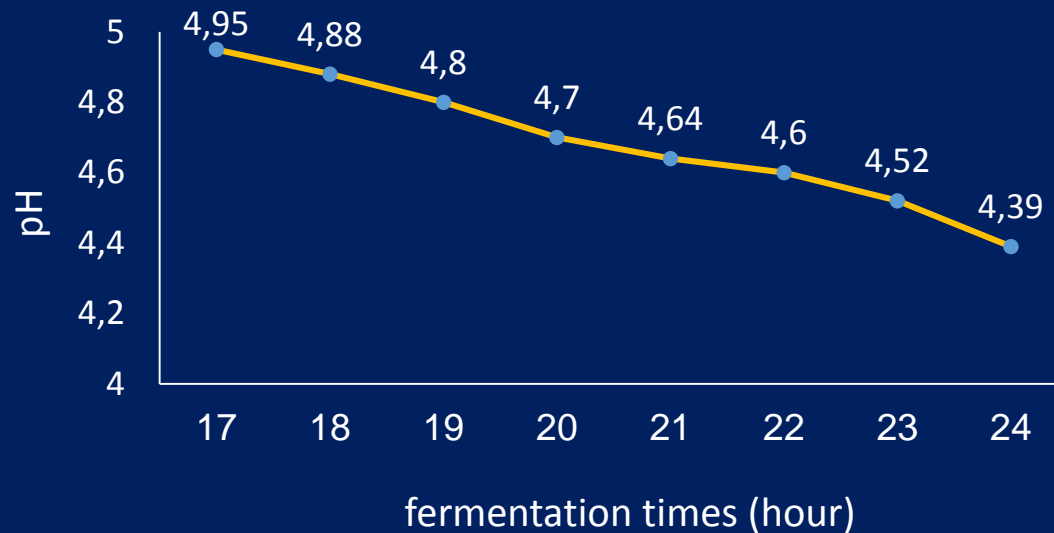
4. Total Lactic Acid Bacteria (cfu/g)

Fermentation times	temperature			
	41°C	42°C	43°C	44°C
15 hour	$3,96 \times 10^{10}$	$6,9 \times 10^{10}$	$2,6 \times 10^{10}$	$1,05 \times 10^{10}$
16 hour	$7,08 \times 10^{10}$	$3,95 \times 10^9$	$1,29 \times 10^{11}$	$2,85 \times 10^{10}$
17 hour	$2,87 \times 10^{11}$	$9,73 \times 10^{10}$	$1,64 \times 10^{11}$	$2,22 \times 10^{11}$
18 hour	$2,98 \times 10^{11}$	$3,49 \times 10^{10}$	$1,34 \times 10^{12}$	$4,81 \times 10^{11}$
19 hour	$2,53 \times 10^{11}$	$7,52 \times 10^{11}$	$2,73 \times 10^{12}$	$4,27 \times 10^{12}$



Increasing temperature and fermentation time increase the total lactic acid bacteria in yogurt

pH of yogurt at 43°C with different fermentation times



The fermentation time of 24 hours at 43°C produces yogurt which is in accordance with Yogurt pH in general (4.5)

CONCLUSION

1. Yoghurt which is characterized by its good appearance and consistency with specific yoghurt aroma, sour taste and containing viable LAB that met the Indonesian Standard for yoghurt was produced at 43°C with 19 hours fermentation period.
2. The fermentation time of 24 hours at 43°C produces yogurt which is in accordance with Yogurt pH in general

Thank You
Terima Kasih



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Certificate

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Dr. Ir. Komang Ayu Nocianitri, M.Agr.Sc.

HAS PARTICIPATED AS

Presenter

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OCTOBER 22-23 2018, THE PATRA BALI RESORT & VILLAS, KUTA - BALI

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