

# Potential Of Ampel Bamboo Shoots (*Bambusa vulgaris*) Pickle "*Lactobacillus fermentum* LLB3" and "*Lactobacillus pentosus* LLA18" As A Starter For Mozzarella Cheese And Beverage

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# Benefits of Bamboo Shoots

Organic  Facts

Aids in  
weight loss

Reduces risk  
of cancer

Strengthens  
immune system

**Why bamboo shoots is best?**

Helps improve  
heart health

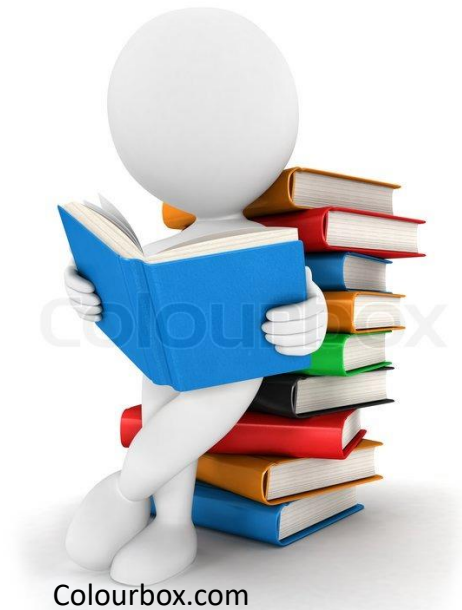
Useful in  
curing snake and  
scorpion bites

Effective  
against respiratory  
diseases

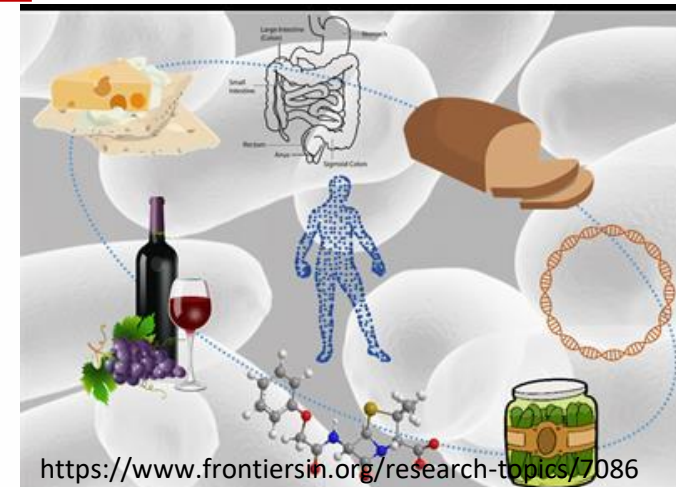
[www.organicfacts.net](http://www.organicfacts.net)

<https://www.organicfacts.net/health-benefits/other/health-benefits-of-bamboo-shoots.html>

Based on previous research, it is known that the results of lactic acid bacteria isolate from Ampel bamboo shoots (*Bambusa vulgaris*) pickled has been promising as probiotic and ability to produce bacteriocins as natural antimicrobial compound. After obtaining lactic acid bacteria that have potential as probiotics, the research was tested on *Sprague Dawley* rats (T2DM). After Consumption of probiotic fermented milk in *Sprague Dawley* rats (T2DM) decreased the blood glucose and total cholesterol.

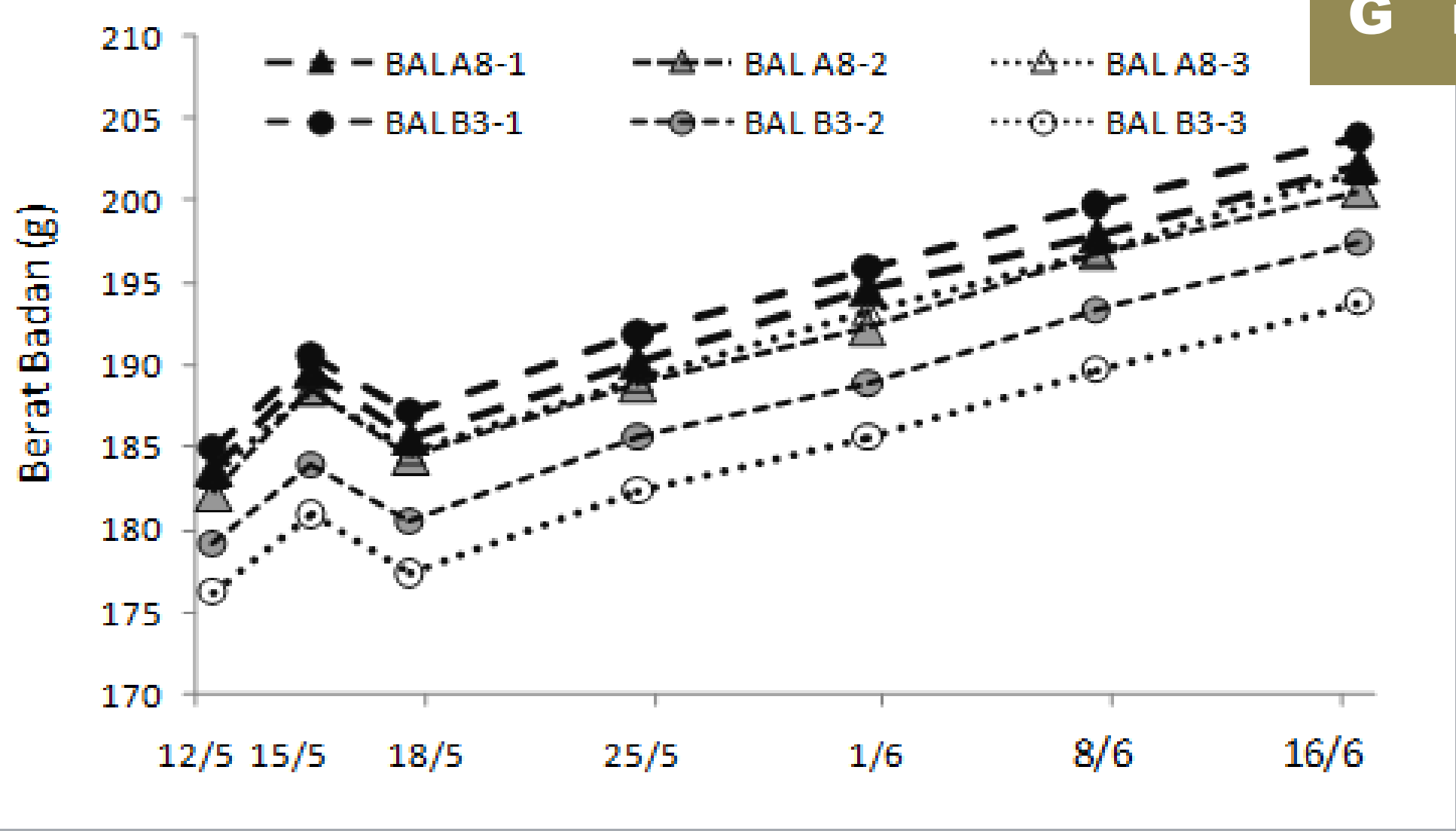


To date, several studies which showed that the isolation of lactic acid bacteria from Ampel bamboo shoots (*Bambusa vulgaris*) pickled had the opportunity to be used as a starter in the food processing process, then conducted research as a starter in making mozzarella cheese using *Lactobacillus fermentum* LLB3 and probiotic drinks from duwet (*Syzygium cumini*) fruit extract which was fermented with *Lactobacillus pentosus* LLA18.

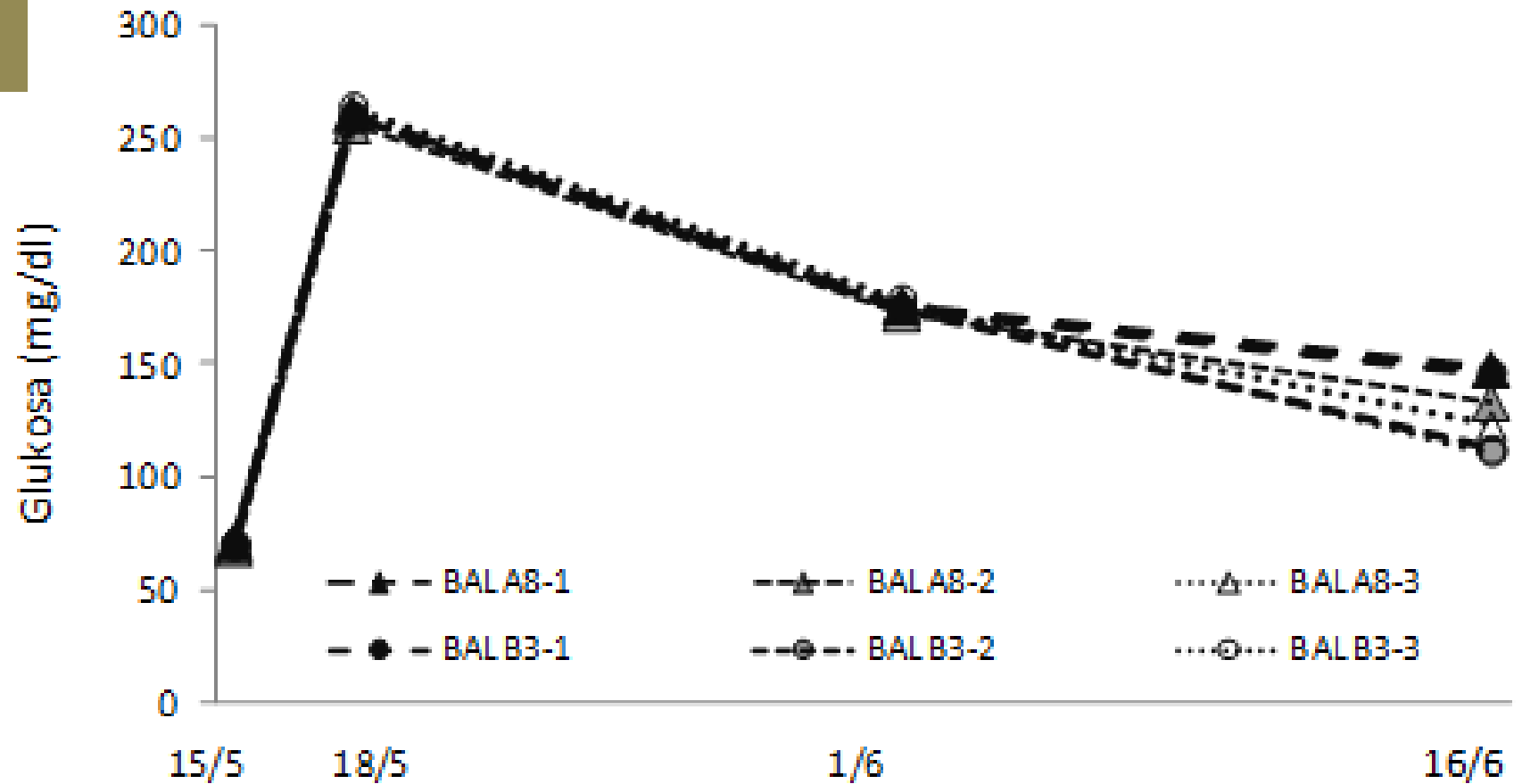


Body weight of sprague dawley (g) before and after induction with STZ 60 mg/Kg, Na 120 mg/Kg from 15 of May 2017 to 16 of June 2017 for each treatment fermented milk with *Lactobacillus fermentum* (B3) and *Lactobacillus pentosus* (A8)

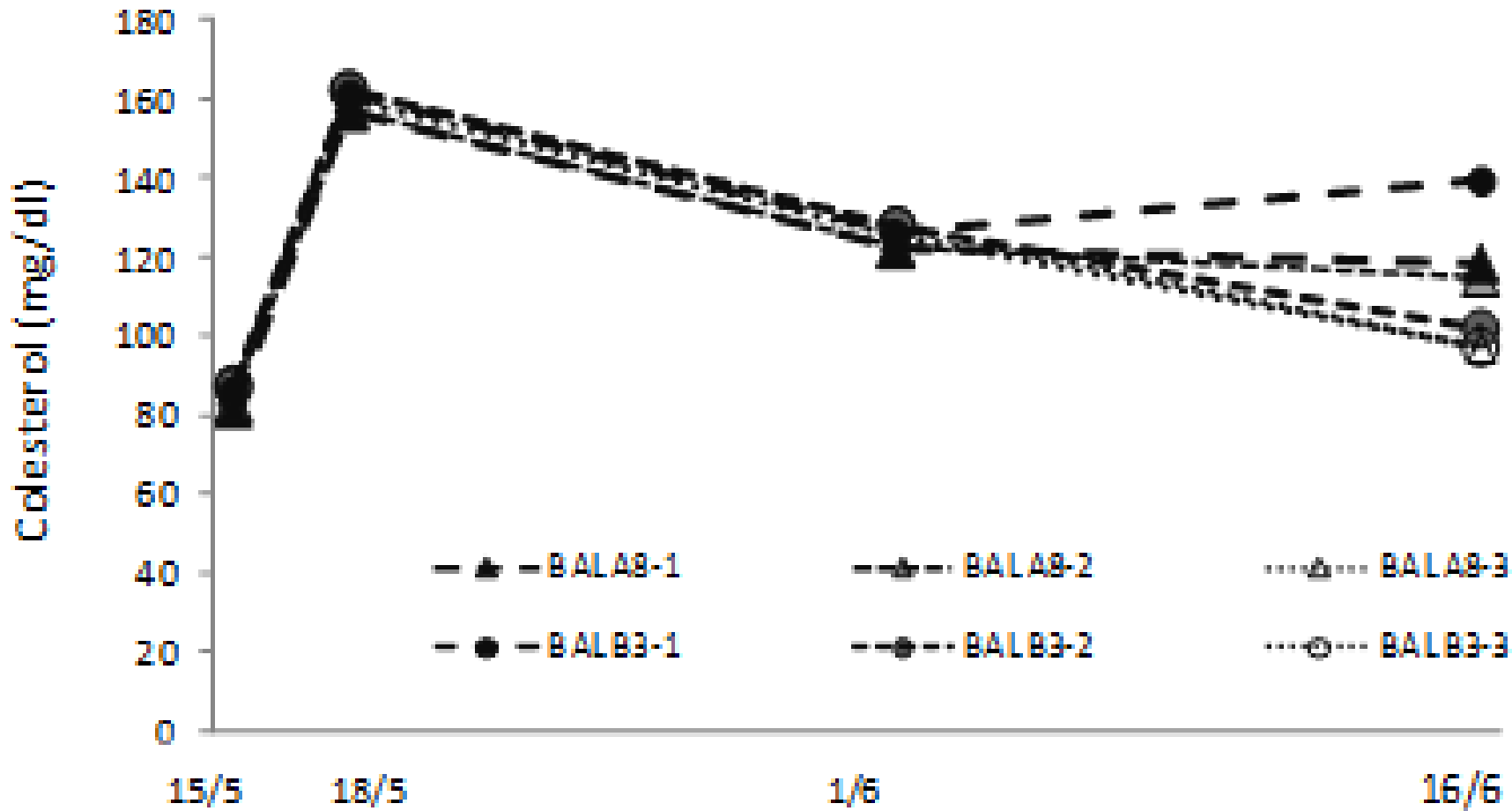
# Graph 1



# Graph 2



Blood glucose of sprague dawley (mg/dL) induction with STZ 60 mg/Kg, Na 120 mg/Kg and the progress after two and four weeks treatments with treatment fermented milk with *Lactobacillus fermentum* (B3) and *Lactobacillus pentosus* (A8)



Total cholesterol of sprague dawley (mg/dL) induction with STZ 60 mg/Kg, Na 120 mg/Kg and the progress after two and four weeks treatments with treatment fermented milk with *Lactobacillus fermentum* (B3) and *Lactobacillus pentosus* (A8)

## Graph 3



# Related publication on our project

**MICROBIOLOGY  
INDONESIA**  
ISSN 1978-3477, eISSN 2087-8575  
Vol.12, No.1, March 2018, p 7-14

Available online at  
<http://jurnal.permi.or.id/index.php/mioline>  
DOI: 10.5454/mi.12.1.2

## The Effect of Carbon and Nitrogen Supplementation on Bacteriocin Production of Lactic Acid Bacteria from Pickled Yellow Bamboo Shoots (*Dendrocalamus Asper*)

LAKSMI HARTAJANIE\*, LINDAYANI, AND LORENTIA SANTOSO

UNIKA Soegijapranata, Jalan Pawiyatan Luhur IV/1, Semarang 50234, Indonesia

Six selected lactic acid bacteria (LAB) isolates from pickled Yellow Betung bamboo shoots were grown on the Mann Rogosa Sharpe-Broth (MRSB) media with different supplementation combination. The cell supernatant were evaluated for their ability to produce bacteriocin by adjusting its pH to 6.0 in order to reduce organic acid effects. The bacteriocin activity was assayed by agar-well diffusion method. The inhibitory activity calculated in Activity Unit (AU in mm<sup>2</sup> mL<sup>-1</sup>) of bacteriocins. The aim of this paper is to explore the effect of different medium compositions on bacteriocin production and its inhibitory activity against pathogenic bacteria (*Listeria monocytogenes* FNCC 0156, *Staphylococcus aureus* FNCC 0047, and *Escherichia coli* FNCC 001).

**MICROBIOLOGY  
INDONESIA**  
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DOI: 10.5454/mi.12.1.5

### SHORT COMMUNICATION

## Probiotic Potential of Lactic Acid Bacteria from Yellow Bamboo Shoot Fermentation using 2.5% and 5% Brine at Room Temperature

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UNIKA Soegijapranata, Jalan Pawiyatan Luhur IV/1, Semarang 50234, Indonesia

Yellow bamboo shoot is a popular food material especially in Semarang because it is used as filling for *lumpia* (authentic food of Semarang). Besides used as filling, yellow bamboo shoot commonly known by Indonesian people. Considering bamboo shoot often processed into fermented traditional food, yellow bamboo shoot also has potential to be examined as source of fermented food producing lactic acid bacteria. Lactic acid bacteria still become the most beneficial microorganisms associated with gastrointestinal system and moreover for obesity diet. The aim of this research is to study the probiotic potential of lactic acid bacteria produced from yellow bamboo shoot fermentation in 2.5% and 5% brine under room temperature (30 °C). From isolation, 22 single colonies obtained from 2.5% brine and 27 isolates obtained from 5% brine. The morphology and physiology analysis resulted in *Lactobacillus* and *Streptococcus* genus. All isolates were tested subsequently for probiotic potential. Based on the result, more than 50% identified isolates have probiotic potential.

Key words: lactic acid bacteria, probiotic, yellow bamboo shoot

Effect of *Lactobacillus pentosus* A8 and *Lactobacillus fermentum* B3 Isolated From Bamboo Shoot (*Bambusa vulgaris*) Pickle on Probiotic Fermented Milk for Health Benefits

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9<sup>th</sup> ISISM (14-15 of Nov 2017)

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**MICROBIOLOGY  
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ISSN 1978-3477, eISSN 2087-8575  
Vol.12, No.2, June 2018, p 61-64

## *Lactobacillus fermentum* LLB3 Improves Antioxidant Activity of Bitter Melon (*Momordica charantia*) Juice

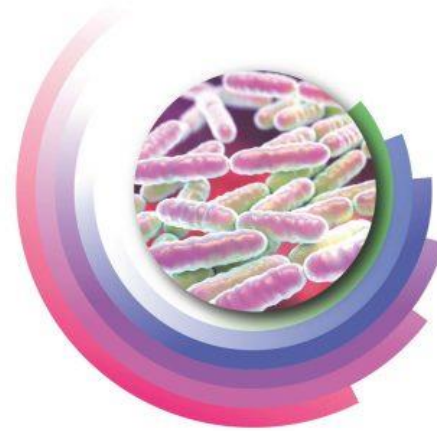
LAKSMI HARTAJANIE\*, LINDAYANI, ANGELA NOVITA, EMILIA TRIVIANA SUTANTO, AND AGATA APRILIANA SUNDORO

UNIKA Soegijapranata, Jalan Pawiyatan Luhur IV/1, Semarang 50234, Indonesia

*Momordica charantia* (bitter melon) contains substances with antidiabetic properties such as charantin, chlorogenic acid, and polypeptide-p, as well as other unspecific bioactive components such as antioxidants. It is suitable for medicinal drink and needs further studies to elaborate its functional properties. *Lactobacillus fermentum* LLB3 isolated from bamboo shoot pickle was used to ferment bitter melon juice. The aim of this study was to evaluate the effect of antioxidant activity of bitter melon juice during fermentation. Study has been carried out by fermenting bitter melon juice with *L. fermentum* LLB3. The free radical scavenging activity of the phenolics was done using 2,2-diphenyl-1-picrylhydrazyl (DPPH). Antioxidant activity of bitter melon juice increased after 24 hours fermentation. In addition, the sugar content and pH decreased compared with the baseline value. Fermentation of bitter melon juice by *L. fermentum* LLB3 increased its antioxidant activity. These results show that fermented bitter melon juice is a promising agent for diabetes management.

Key words: antioxidant activity, bamboo shoot pickle, bitter melon, diabetes management, *Lactobacillus fermentum* LLB3

# The Many Benefits of Lactic Acid Bacteria



Jean Guy LeBlanc  
Alejandra de Moreno de LeBlanc  
Editors

NOVA

Publication Date: July 2019





<https://tanamanbibit.com/product/jual-bibit-buah-kedondong-murah/>



Mozzarella Cheese & non-dairy fermented beverages is a duwet fruit (*Syzygium cumini*)



How Success is Like a Chinese Bamboo Tree - Matt Morris

Lactic acid bacteria isolate from Ampel bamboo shoots (*Bambusa vulgaris*) pickled has been promising as probiotic.

Ability to produce bacteriocins as natural antimicrobial compound

Fermented milk using lactic acid bacteria isolates from bamboo shoot pickles has been promising as probiotics drink.



<https://www.tanobat.com/jamblang-ciri-tanaman-serta-khasiat-dan-manfaatnya.html>

# Aim of research



The aim of the research was to determine the potential of *Lactobacillus fermentum* LLB3 and *Lactobacillus pentosus* LLA18 isolates as a starter for making mozzarella cheese and beverage.



# Duwet fruit extract



<https://humarian.com/know-your-probiotics-strains-different-strains-do-different-things/>

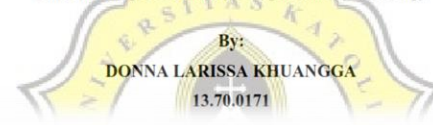
## ***Lactobacillus pentosus* LLA18**

OPTIMIZATION OF BACTERIOCIN PRODUCTION BY LACTIC ACID BACTERIA ISOLATED FROM AMPEL BAMBOO SHOOTS (*Bambusa vulgaris*) PICKLE UNDER DIFFERENT FERMENTATION CONDITIONS USING SUPPLEMENTED WHEY MEDIUM

OPTIMASI PRODUKSI BAKTERIOSIN BAKTERI ASAM LAKTAT YANG DIISOLASI DARI ACAR REBUNG AMPEL (*Bambusa vulgaris*) PADA KONDISI FERMENTASI YANG BERBEDA MENGGUNAKAN MEDIA WHEY YANG DISUPLEMENTASI

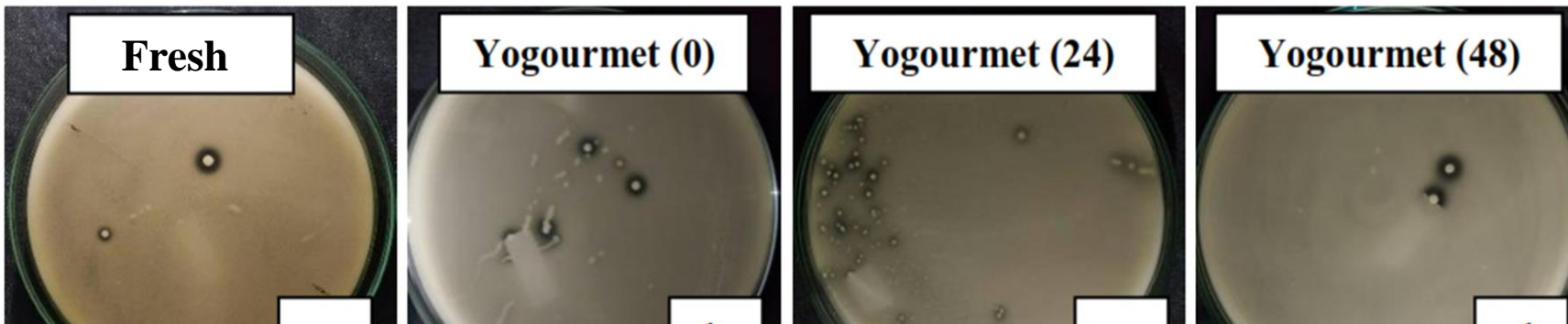
BACHELOR THESIS

Submitted in partial fulfilment of the requirements for a Food Technology Bachelor's degree in Faculty of Agricultural Technology

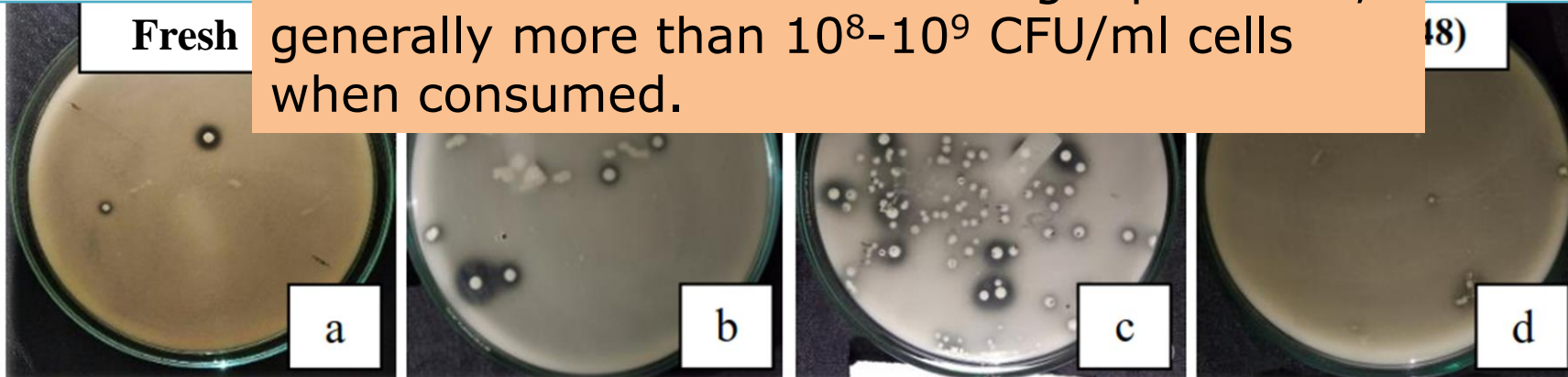


## **Mixed culture "Yogourmet"**

- ***Lactobacillus bulgaricus***
- ***Streptococcus thermophilus***
- ***Lactobacillus acidophilus***



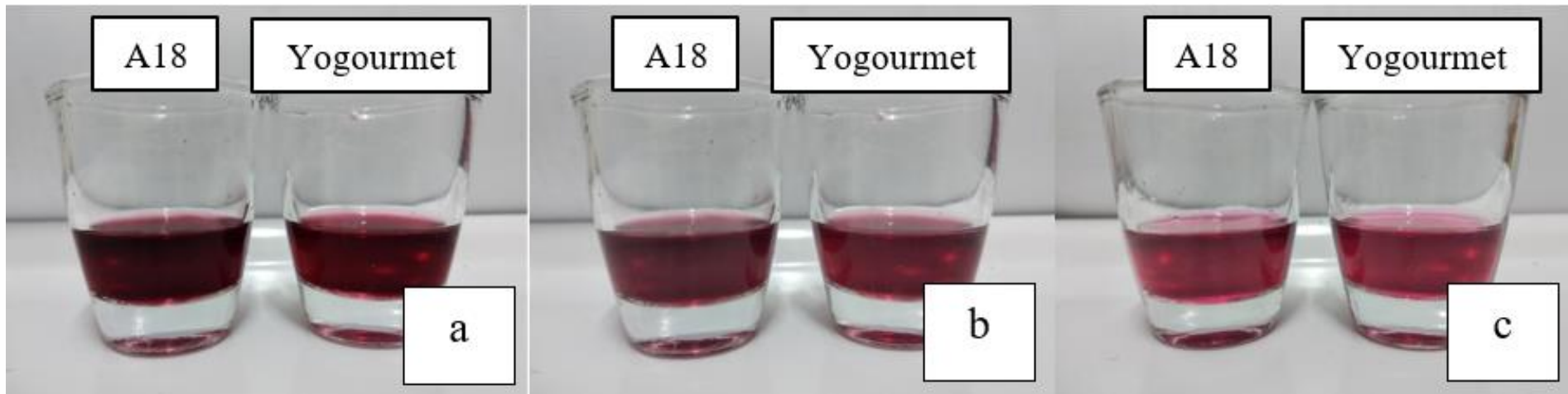
Sample	Lactic acid bacteria colony (CFU/ml)		
	0 hr	24 hrs	48 hrs
Fresh duwet fruit extract	$1 \times 10^3 - 4 \times 10^3$	x	x
Mixed culture "Yogourmet"	The microorganisms present in the product must be live and available in high quantities, generally more than $10^8-10^9$ CFU/ml cells when consumed.		$1 \times 10^7 - 2 \times 10^7$
<i>L. pentosus</i> LLA18			$1 \times 10^7 - 4 \times 10^7$



Total Plate Count of Fresh Duwet Fruit Extract (a); Fermented Duwet Fruit Extract with *Lactobacillus pentosus* LLA18 0 hours (b); 24 hours (c); and 48 hours (d)

Sample	Antimicrobial activity (mm <sup>2</sup> /ml)		
	0 hr	24 hrs	48 hrs
Fresh duwet fruit extract			
<i>E. coli</i> FNCC0091	5234.82 – 7770.71	x	x
<i>S. aureus</i> FNCC0047	6564.25 – 7597.46	x	x
<i>S. thypimurium</i> FNCC0056	6920.96 – 9969.14	x	x
Mixed culture “Yogourmet”			
<i>E. coli</i> FNCC0091	4602.71 – 7151.57	3922.29 - 8900.57	8146.68 – 10132.57
<i>S. aureus</i> FNCC0047	7032.54 – 9807.29	6864.00 – 14633.54	6053.14 – 16574.25
<i>S. thypimurium</i> FNCC0056	3638.25 – 7524.00	2834.46 – 13789.29	4768.89 – 12882.18
<i>L. pentosus</i> LLA18			
<i>E. coli</i> FNCC0091	7040.00 – 8132.14	5341.29 - 9163.00	8401.25 – 13432.18
<i>S. aureus</i> FNCC0047	9031.39 – 9969.14	6745.75 – 12653.14	8715.14 – 15071.57
<i>S. thypimurium</i> FNCC0056	7770.71 – 9562.54	5828.04 – 11088.00	6618.86 – 11528.00

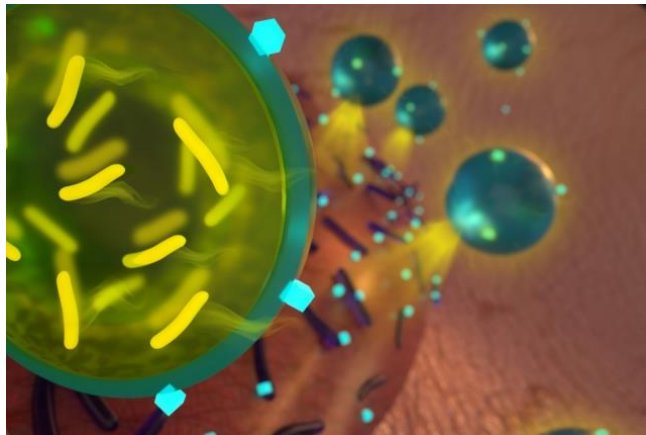
Antimicrobial activity increased



Duwet extract without fermentation (a); Fermentation 24 hrs (b); Fermentation 48 hrs (c)

Sample	Sensory analysis		
	Taste	Flavor	Overall
<b>Fresh duwet fruit extract</b>	3,00 ± 1,05	3,20 ± 1,03	3,17 ± 0,95
<b>Mixed culture “Yogourmet”</b>	3,27 ± 1,20	3,27 ± 1,41	3,30 ± 1,18
<b><i>L. pentosus</i> LLA18</b>	3,40 ± 0,86	3,57 ± 1,01	3,40 ± 1,00

# Mozzarella cheese



<http://news.mit.edu/2018/probiotics-antibiotics-kill-drug-resistant-bacteria-1017>

**ACIDULANT**

Direct acidification



pH 3.17 – 3.43



Long time

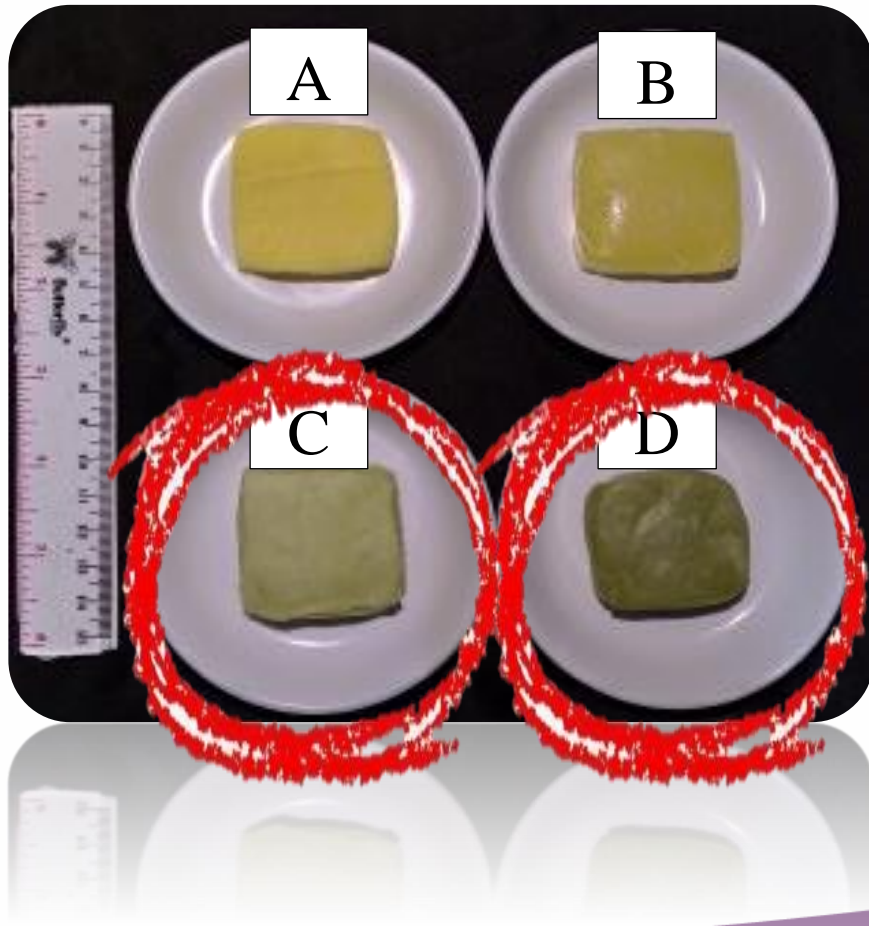


Difficult to control



Short time

# Product of mozzarella cheese

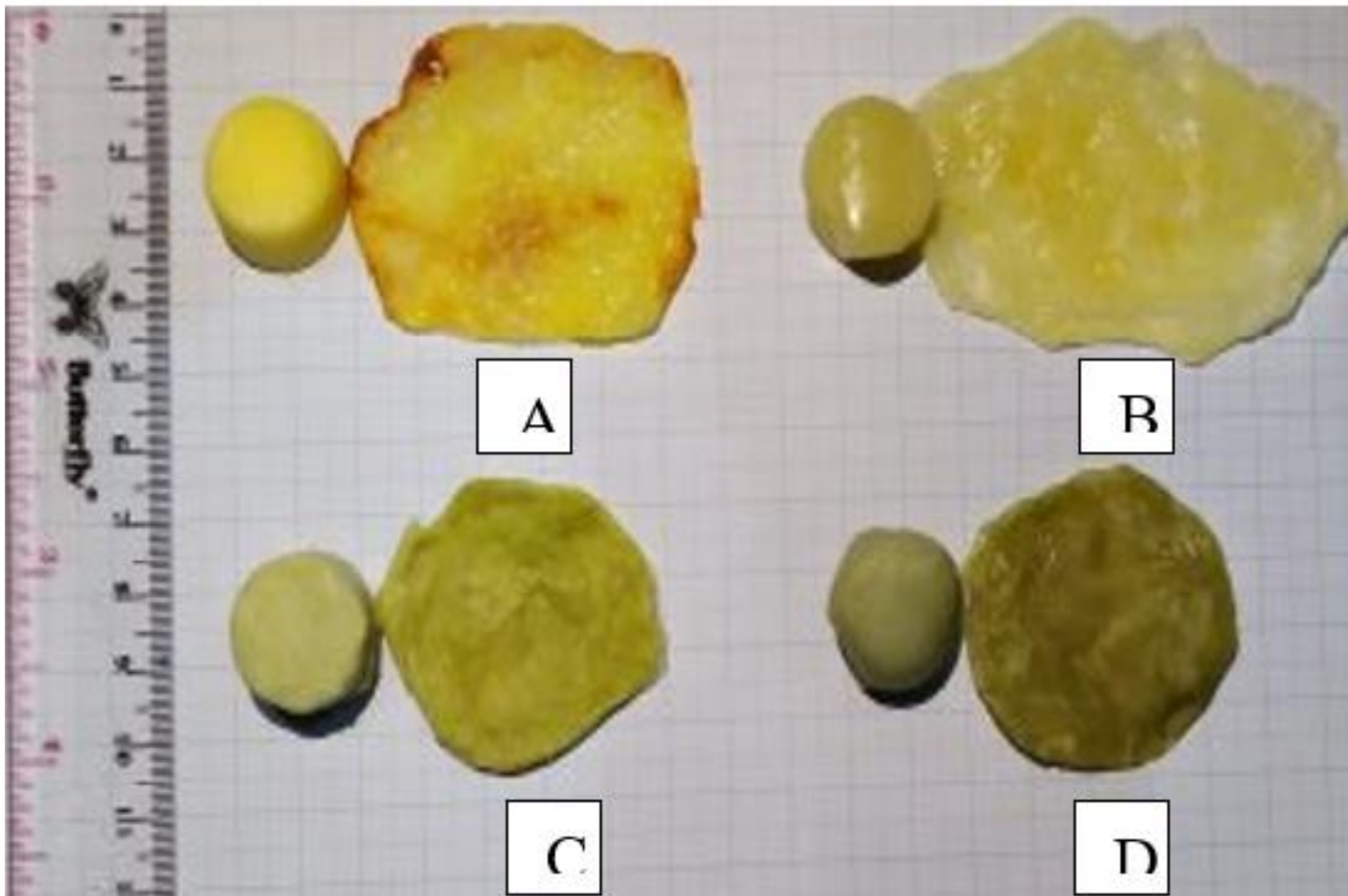


Commercial Mozzarella Cheese (A), Using *L. fermentum* LLB3 (B), Using Concentration *ambarella fruit (Spondias dulcis)* of 5% (C), Concentration *ambarella fruit (Spondias dulcis)* of 7.5% (D)




# Physical analysis of commercial and treatments mozzarella cheese

Type of analysis.	Treatment			
	Commercial	<i>L. fermentum</i> LLB3	Ambarella 5%	Ambarella 7,5%
Rendemen (%)	-	4.11 ± 0.10	4.58 ± 0.12	4,95 ± 0,30
Area (cm <sup>2</sup> )				
Before roasting	4.16	4.16	4.16	4.16
After roasting	20,94±0.89	24.10±1.81	13.21±1.87	17.05±2.23
Meltability (%)	403.73±21.32 <sup>1</sup>	479.82±43.50 <sup>a2</sup>	217.89 ±44.98 <sup>b3</sup>	289.92 ± 69.06 <sup>c4</sup>
hardness (gf)	745.61 ± 81.63 <sup>1</sup>	1301.46±19835 <sup>2</sup>	3092.48±521.88 <sup>3</sup>	2460.41±178.36 <sup>4</sup>
Stretchability (cm)	119.67 ±4.59 <sup>1</sup>	142.17±3.76 <sup>a2</sup>	114.33 ±3.14 <sup>b3</sup>	173.68 ±3.93 <sup>c4</sup>



Commercial mozzarella cheese before and after roasting (A), *L. fermentum* LLB3 (B), *ambarella* fruit 5% (C), *ambarella* fruit 7.5% (D)

## Sensory analysis

Mozzarella cheese	Attribut				
	Stretch			Taste	Overall
Commercial	3.38 ±			3.33 ± 0.76 <sup>a</sup>	3.49 ± 0.76 <sup>a</sup>
<i>L. Fermentum</i> LLB3	1.83 ±			2.62 ± 0.96 <sup>b</sup>	2.43 ± 0.86 <sup>b</sup>
Ambarella fruit 5%	3.22 ±			2.97 ± 0.97 <sup>c</sup>	3.25 ± 0.62 <sup>c</sup>
Ambarella fruit 7.5%	2.94 ±			2.52 ± 0.80 <sup>b</sup>	2.75 ± 0.57 <sup>b</sup>

# CONCLUSION

1. Duwet fruit extract can be used as a *Lactobacillus pentosus* LLA18 fermentation medium in the processing of probiotic drinks. That have  $10^8$ - $10^9$  CFU/ml.
2. The fermentation process of duwet fruit extract causes a decrease in pH and total sugar during the fermentation time (24 and 48 hours), an increase in antimicrobial inhibitory activity and antioxidant activity in 24 hours fermentation.
3. The results of sensory analysis showed that panelists preferred 24-hour fermented duwet fruit extract rather than fresh duwet fruit extract.
4. Mozzarella cheese with the addition of *L. fermentum* LLB3 in the process of making mozzarella cheese has a higher yield, greater meltability, lower hardness, and stretchability than mozzarella cheese with acidulant of ambarella.
5. The addition of ambarella 5% extract is the right concentration for acidulant of mozzarella cheese.
6. Mozzarella cheese produced from ambarella acidulant is more accepted by panelists.
7. The promising of *Lactobacillus fermentum* LLB3 and *Lactobacillus pentosus* LLA18 isolates as a starter for making mozzarella cheese and beverage (duwet fruit extract).

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Donna Larissa Khuangga,  
Agatha Putri Algustie,  
Agata Apriliana Sundoro**

Original Article



JYP

# Exploring Indigenous *Lactobacillus* Species from Diverse Niches for Riboflavin Production

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*Dairy Microbiology, Department, Nutrition National Collection of Dairy Cultures, Dairy Microbiology Division, National Dairy Research Institute, Karnal, Haryana, INDIA-132001.*

Journal of Young Pharmacists Vol 7 • Issue 2 • Apr-Jun 2015



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## Food Control

journal homepage: [www.elsevier.com/locate/foodcont](http://www.elsevier.com/locate/foodcont)



### Review

## Novel biotechnological applications of bacteriocins: A review

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### Lactic acid bacteria in dairy food: Surface characterization and interactions with food matrix components

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