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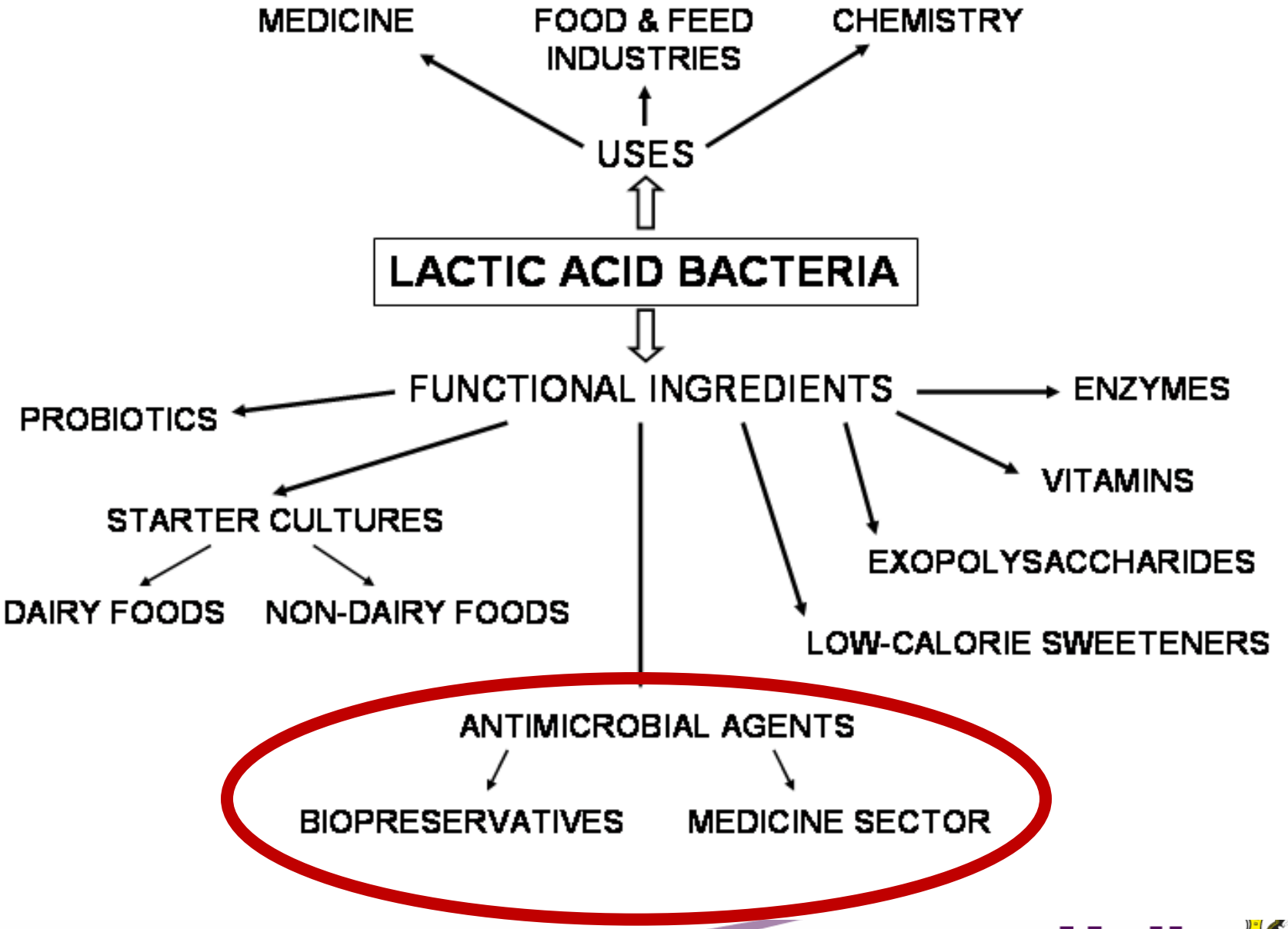
Induksi Produksi Bakteriosin Bakteri Asam Laktat Yang Diisolasi Dari Acar Rebung

Lindayani, Laksmi Hartajanie, Agatha Putri Algustie, Donna Larissa Khuangga
Email: lindayani@unika.ac.id

Program Studi Teknologi Pangan, Fakultas Teknologi Pertanian, Universitas Katolik Soegijapranata-Semarang



https://www.intechopen.com

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Aktivitas antimikroba: probiotik dapat menghambat bakteri pathogen melalui penghambatan perkembangan bakteri dan menghasilkan senyawa antimikroba seperti bakteriosin., senyawan organik, hydrogen peroxide.

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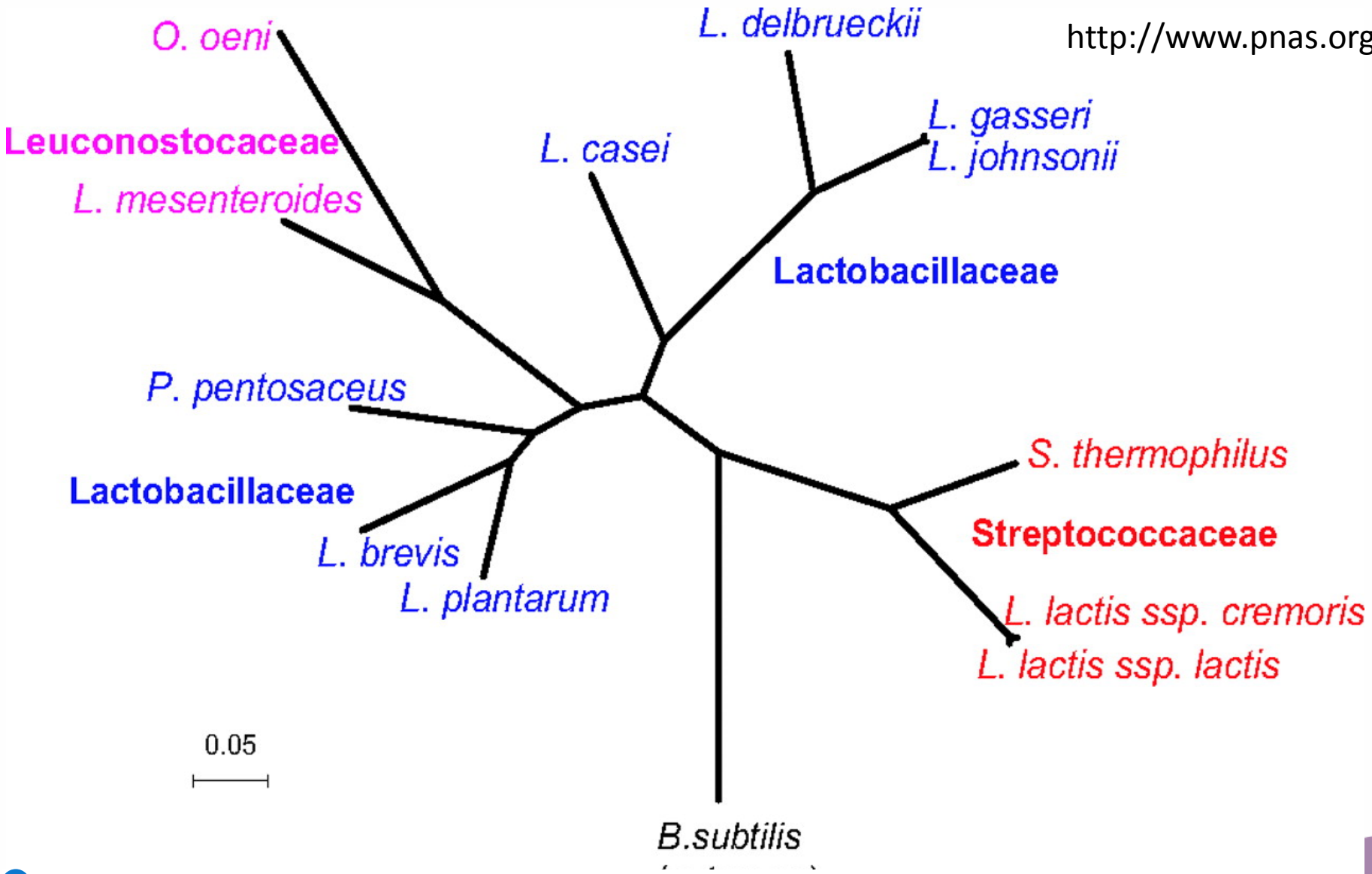
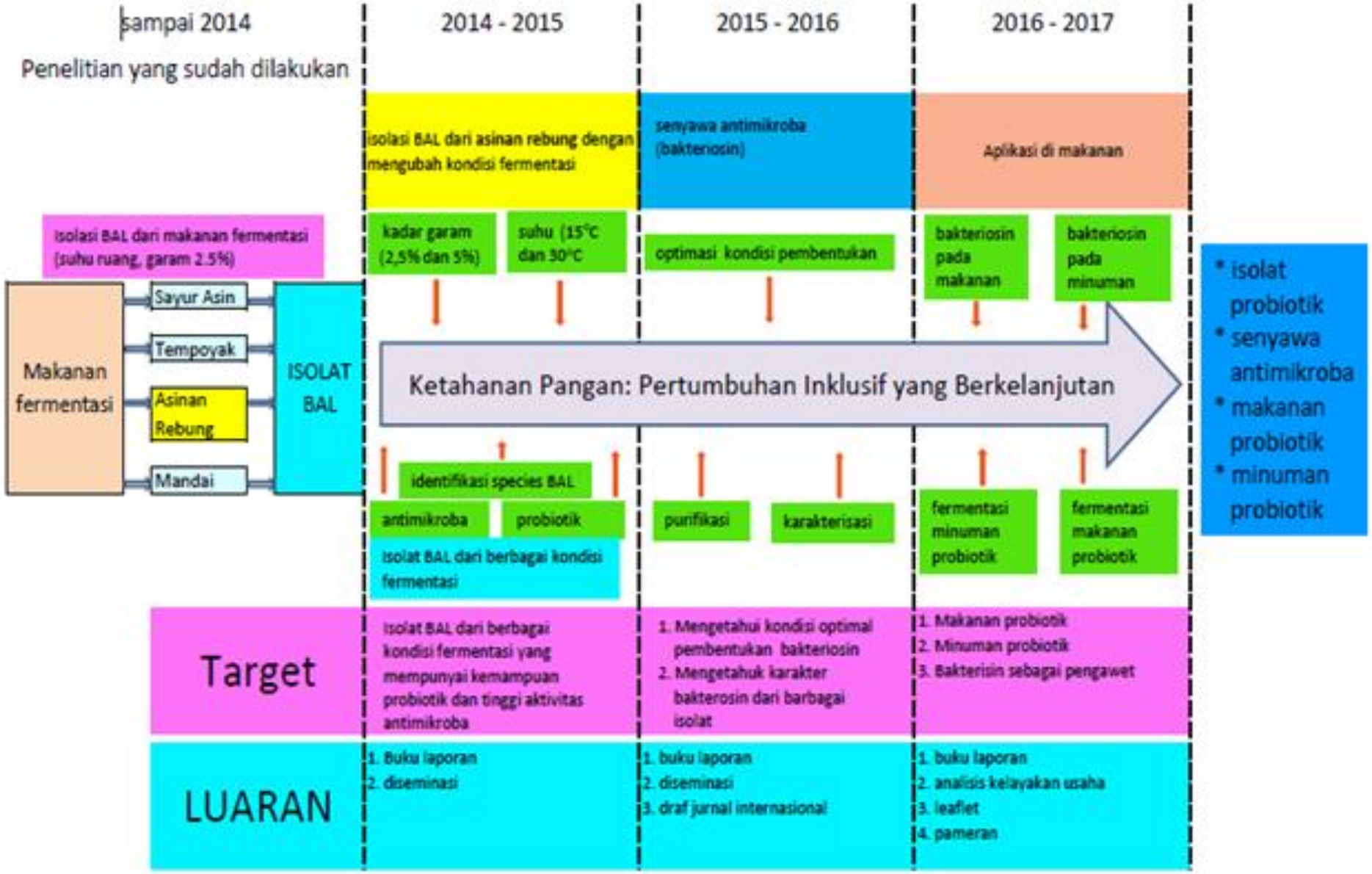
http://www.pnas.org/



1 Phylogenetic trees of Lactobacillales constructed on the basis of concatenated alignments of ribosomal proteins. All branches are supported at >75% bootstrap values. Species are colored according to the current taxonomy: Lactobacillaceae, blue; Leuconostocaceae, magenta; Streptococcaceae, red.



Roadmap of Research

Isolasi dan identifikasi BAL berdasarkan morphologi sel, uji physiologi, potensi probiotik dan aktivitas antimikroba

↓

Produksi bakteriosin pada berbagai media

↓

MRS-B tanpa suplemen (kontrol)

Dengan suplemen

- Whey + Carbon
  - Whey + 1% of Glucose
- Whey + Carbon + Nitrogen
  - Whey + 1% of Glucose + 2% of Tryptone
  - Whey + 1% of Glucose + 2% of Yeast Extract
  - Whey + 1% of Glucose + 1.25% of Tryptone + 0.75% of Yeast Extract
- MRS-B + Carbon
  - MRS-B + 2% of Sucrose
- MRS-B + Carbon + Nitrogen
  - MRS-B + 2% of Sucrose + 1% of Peptone
  - MRS-B + 2% of Sucrose + 0.8% of Yeast Extract
  - MRS-B + 2% of Sucrose + 1% of Peptone + 0.8% of Yeast Extract

↓

Uji aktivitas bakteriosin Test

Aktivitas bakteriosin (mm^2/ml) = AU/ml

$$= \frac{Lz - Ls}{V}$$

Keterangan/*Note*:

Lz = luas zona bening (mm^2)

Ls = luas sumuran (mm^2)

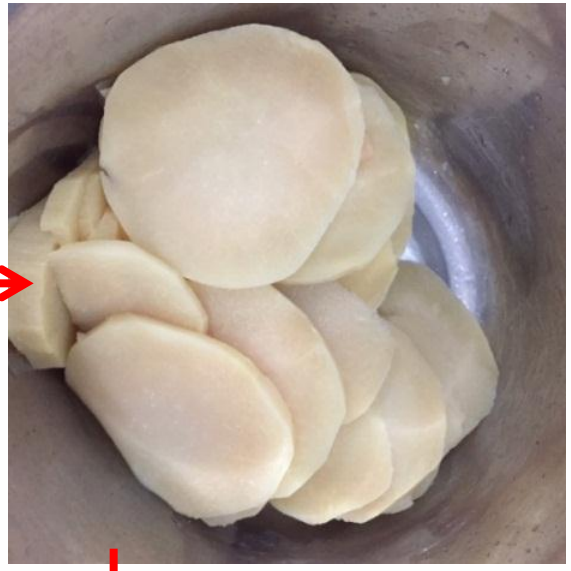
V = volume sampel (mL)

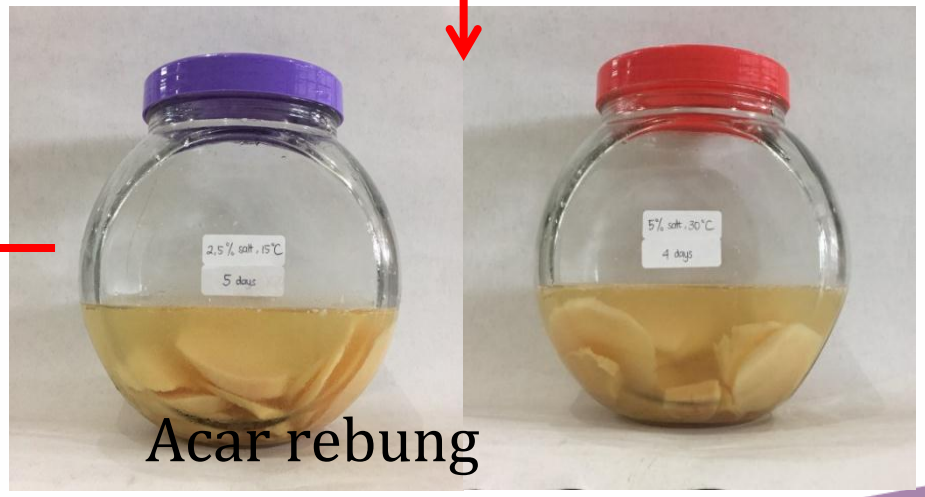
A: 2,5% laruatan garam pada 15°C

B: 5% larutan garam pada 30°C

Tujuan Penelitian

Menemukan formulasi media untuk produksi bakteriosin bakteri asam laktat yang ditumbuhkan dalam media MRSB dan 1% whey dengan suplemen C dan N.





Acar rebung

Sumber: Agatha Putri Algustie, 2017

16 isolat = hasil fermentasi A

19 isolat = hasil fermentasi B

Potensi Probiotik

Acid tolerance → **pH 3** & pH 7; pengamatan 0; 1.5; 3 jam

Bile salts tolerance → **0.3%** & 0.5%; pengamatan 0; 2; 4 jam

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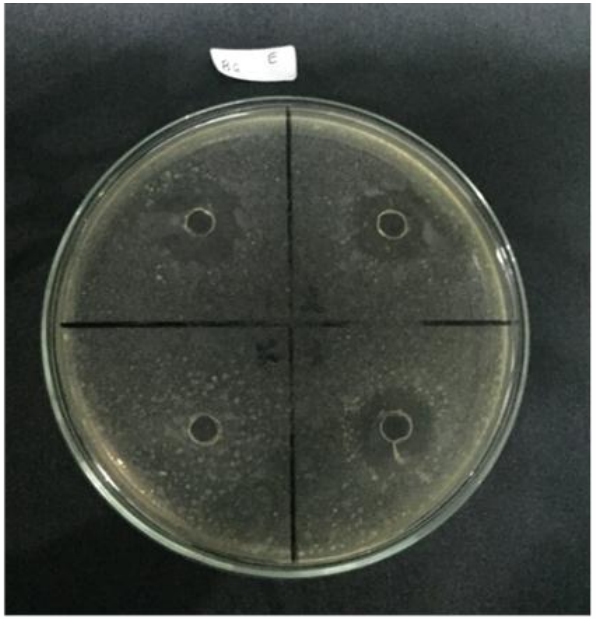
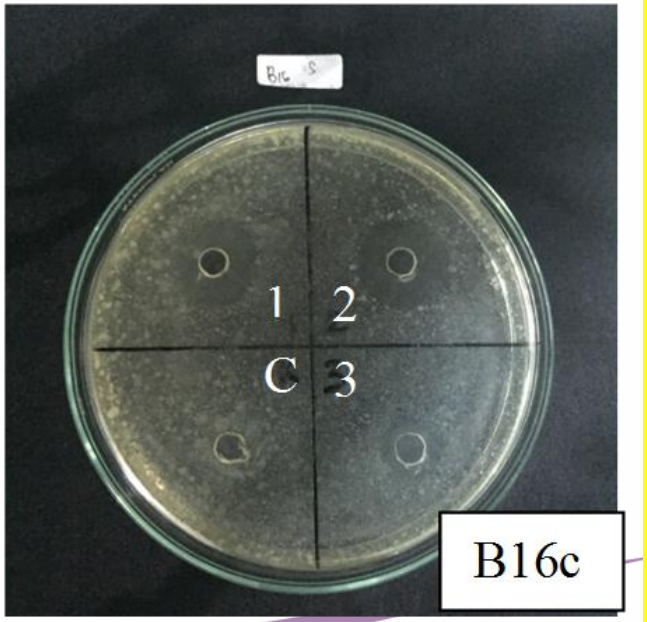
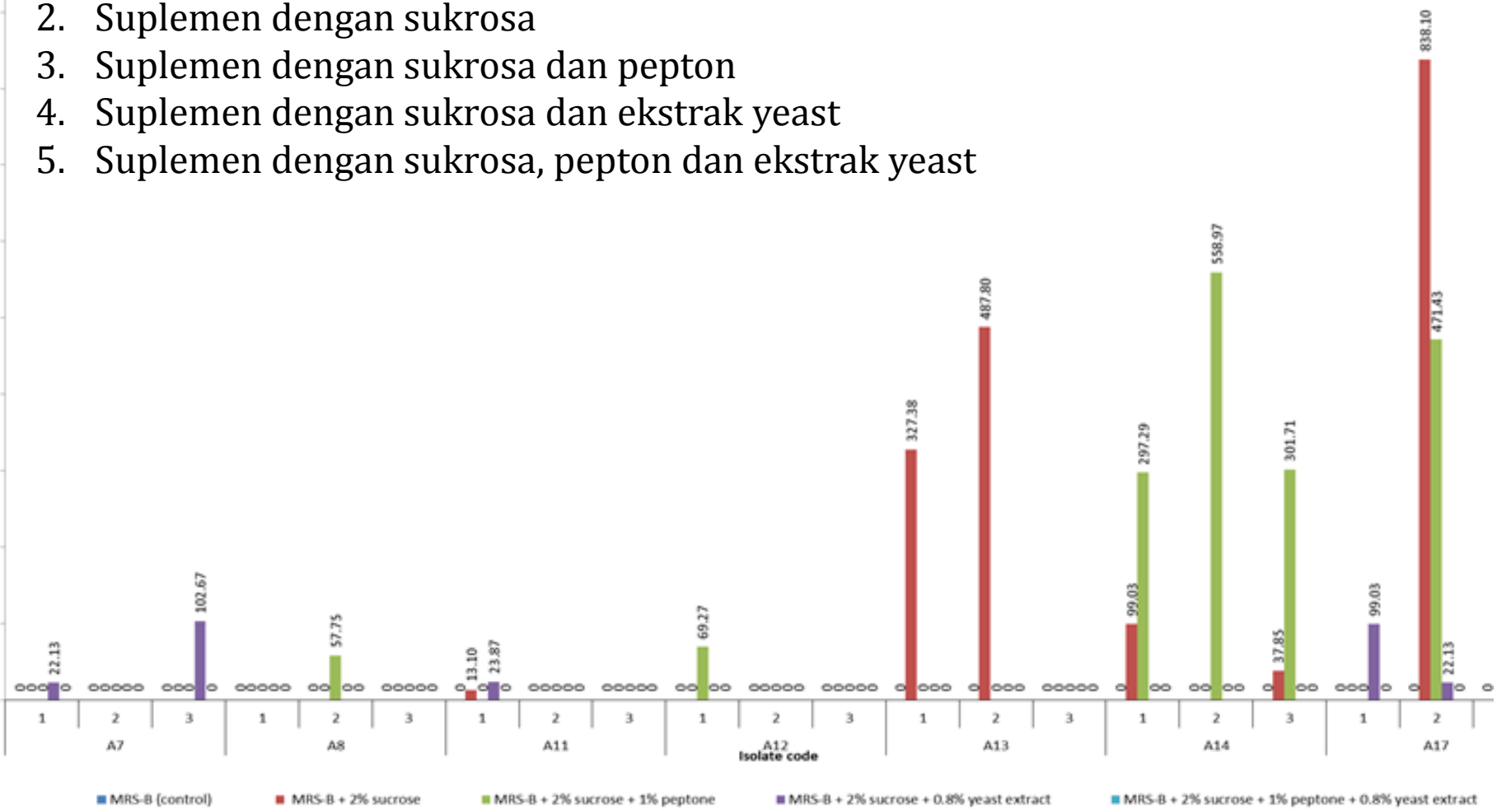




Ket: C = MRS-B control
1, 2, 3 = ulangan

Keterangan gambar: zona hambat aktivitas antimikroba (B16) terhadap *E. coli* FNCC 0091 (B16a); *L. monocytogenes* FNCC 0156 (B16b); dan *S. aureus* FNCC 0047 (B16c)

1. Kontrol (MRS B)
2. Suplemen dengan sukrosa
3. Suplemen dengan sukrosa dan pepton
4. Suplemen dengan sukrosa dan ekstrak yeast
5. Suplemen dengan sukrosa, pepton dan ekstrak yeast



Ket: 1 = *E. coli* FNCC 0091; 2 = *L. monocytogenes* FNCC 0156; 3 = *S. aureus* FNCC 0047

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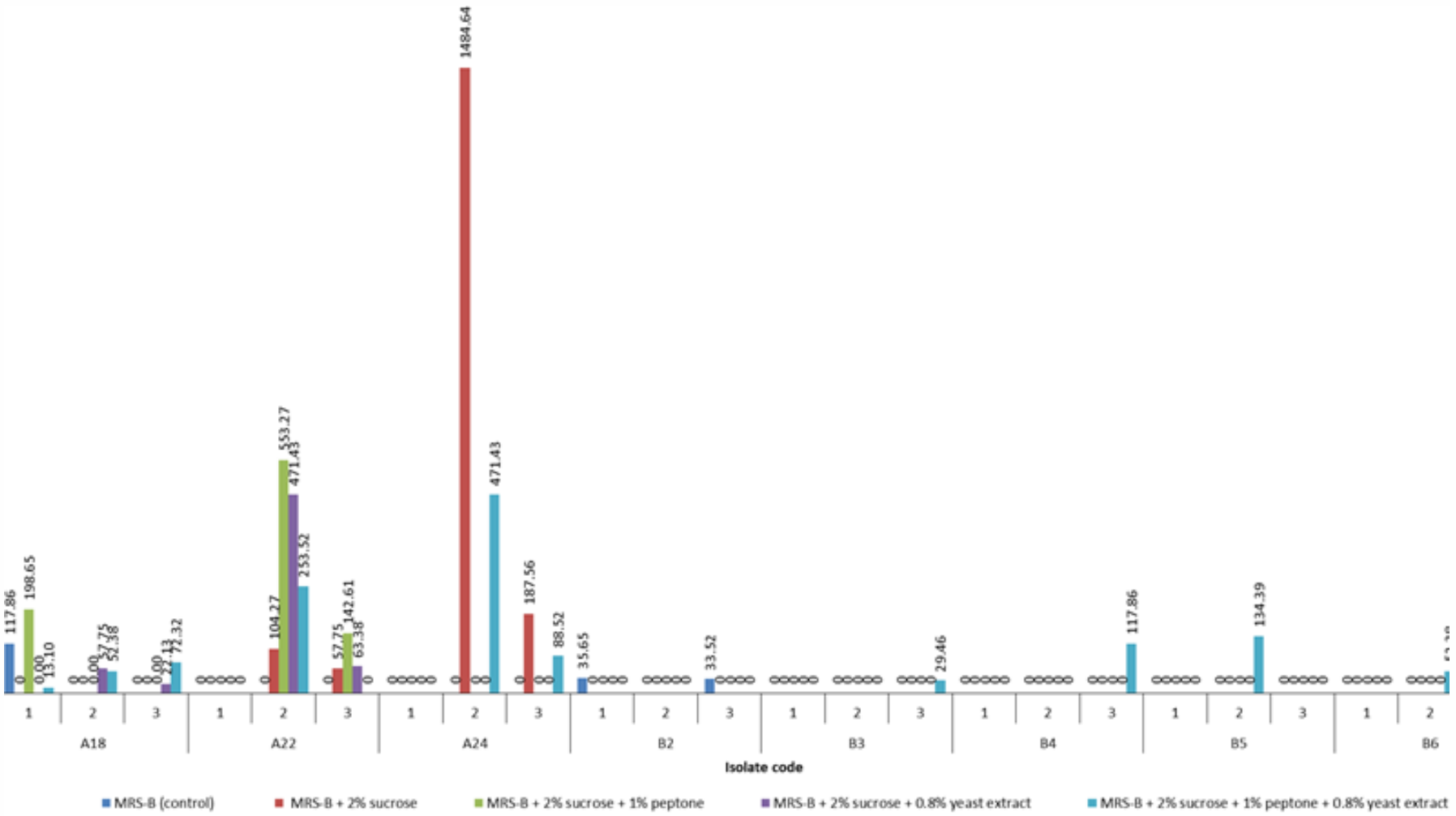
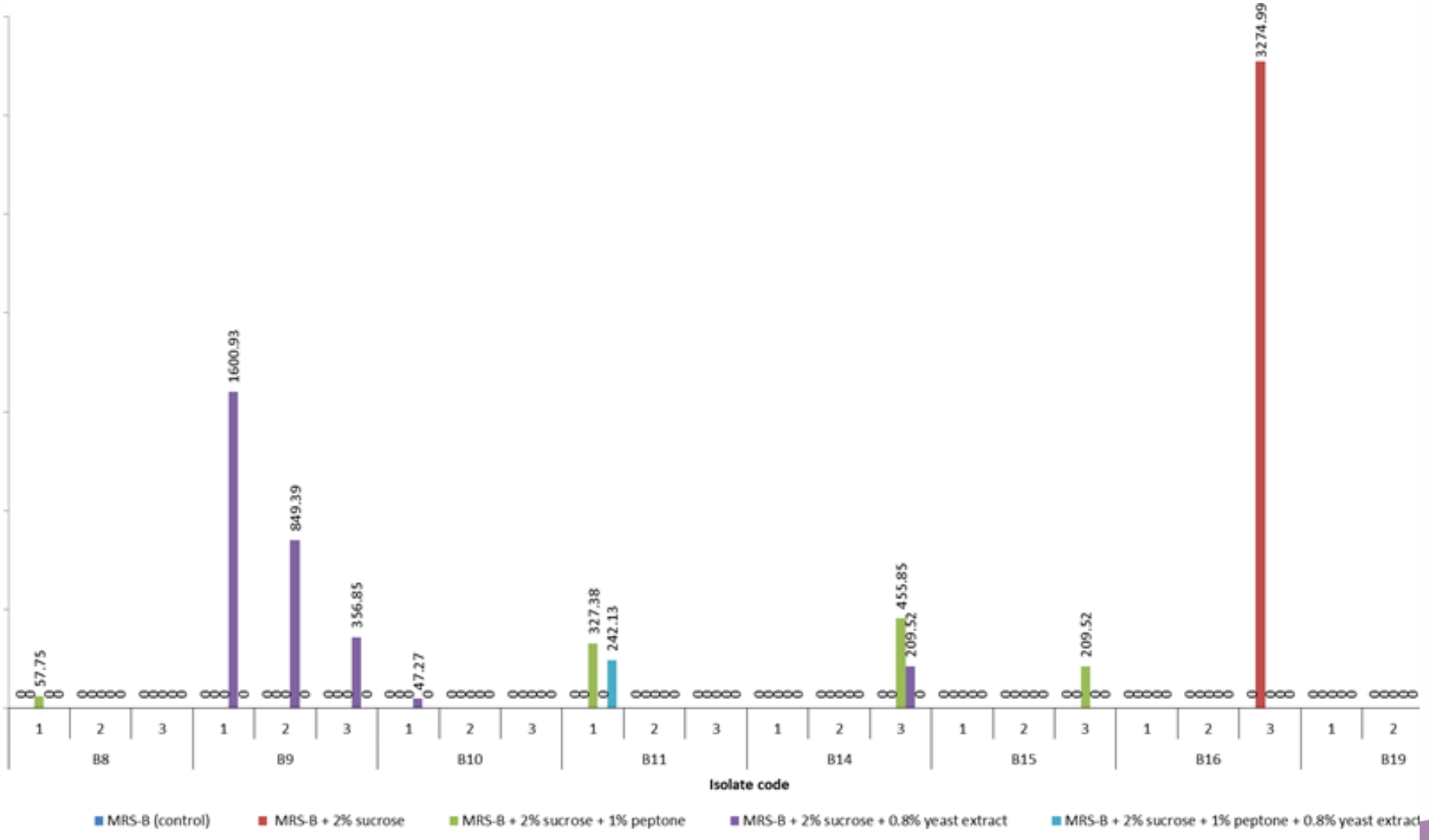

1484.64
553.27
471.43
253.52
198.65
187.56
142.61
117.86
104.27
88.52
63.38
57.75
52.38
35.65
33.52
29.46
13.10
A18
A22
A24
B2
B3
B4
B5
B6
Isolate code
MRS-B (control)
MRS-B + 2% sucrose
MRS-B + 2% sucrose + 1% peptone
MRS-B + 2% sucrose + 0.8% yeast extract
MRS-B + 2% sucrose + 1% peptone + 0.8% yeast extract

(lanjutan)



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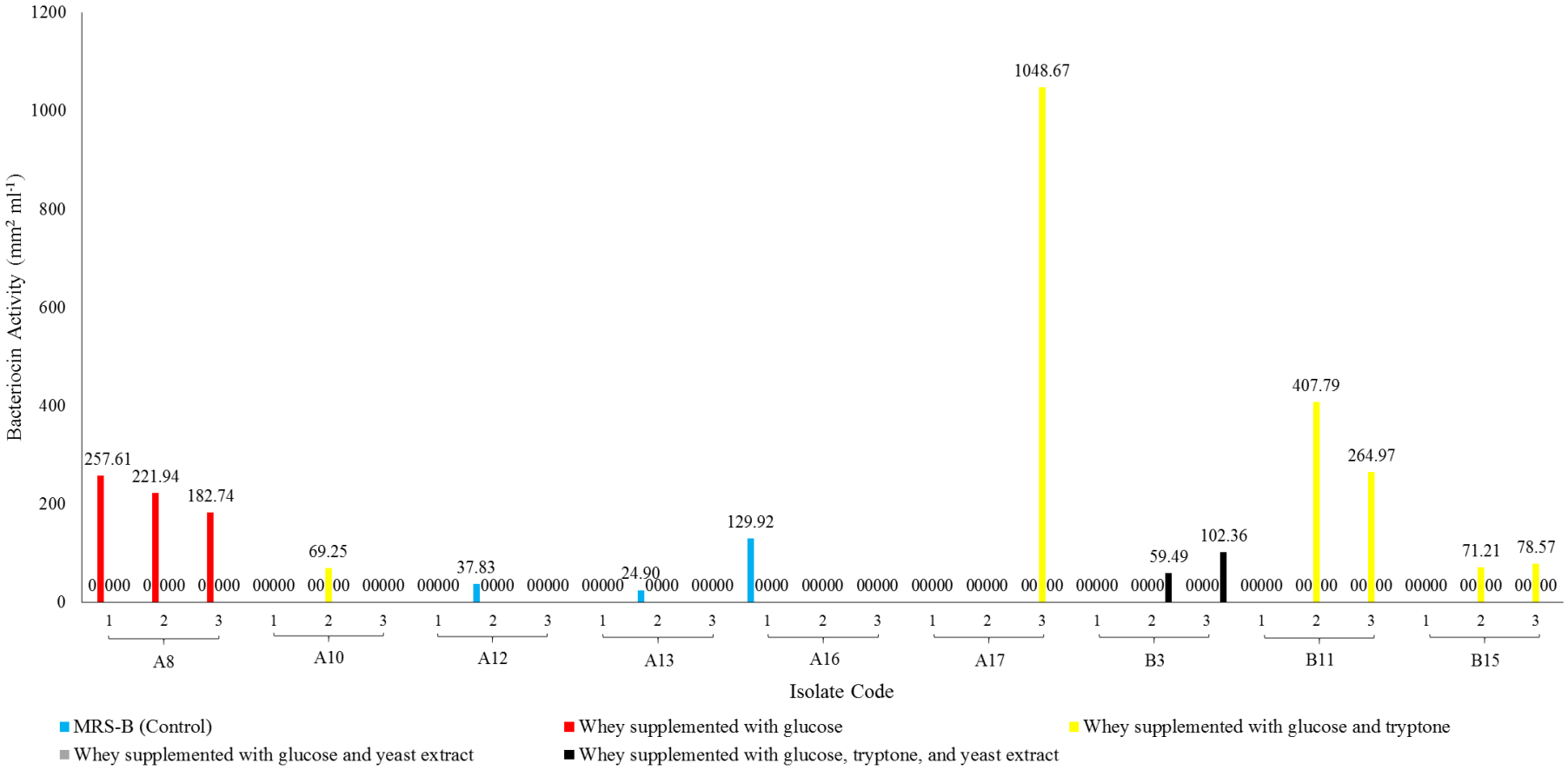

Keterangan: 1 = *E. coli* (FNCC 0091); 2 = *L. monocytogenes* (FNCC 0156); 3 = *S. aureus* (FNCC 0047)

(Aktivitas bakteriosin (mm^2 ml^{-1}) pada media suplemen dengan Whey)

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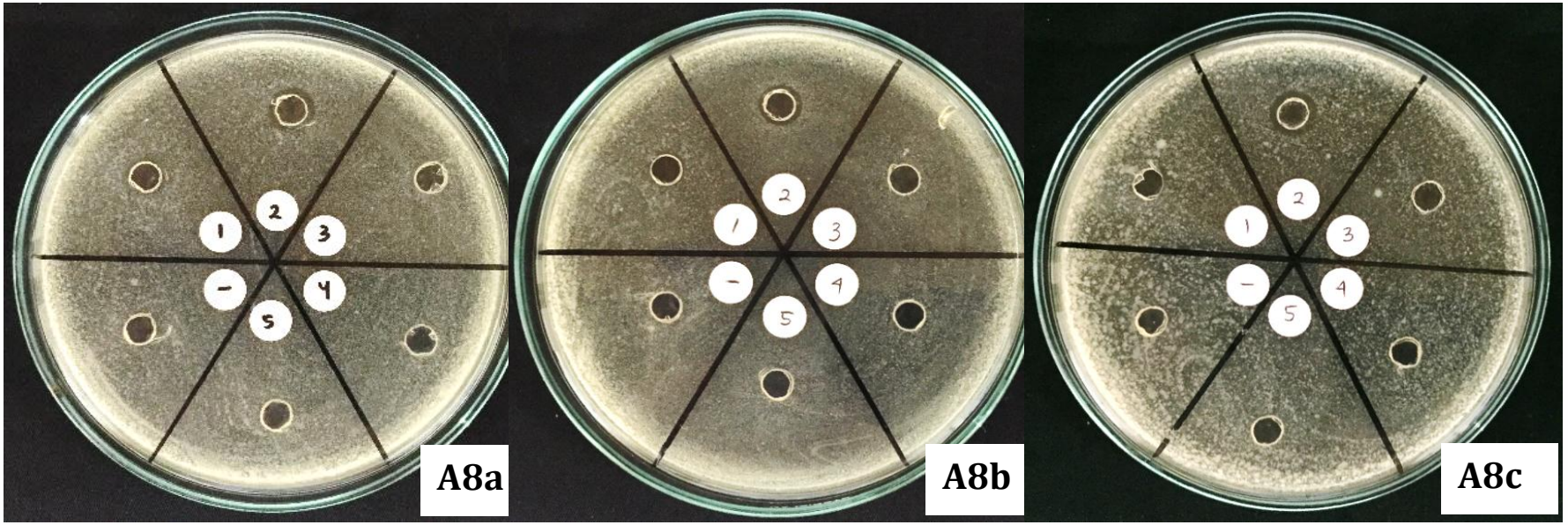
Whey + glukosa → Isolate A8 (*Lb. pentosus*)

Glucose → dapat mempercepat produksi bakeriosin →ideal sebagai sumber C



Ket: a = *E. coli* (FNCC 0091); b = *L. monocytogenes* (FNCC 0156); c = *S. aureus* (FNCC 0047)

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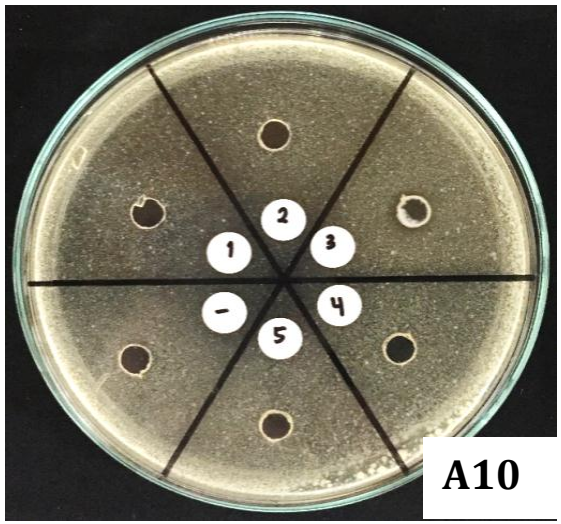
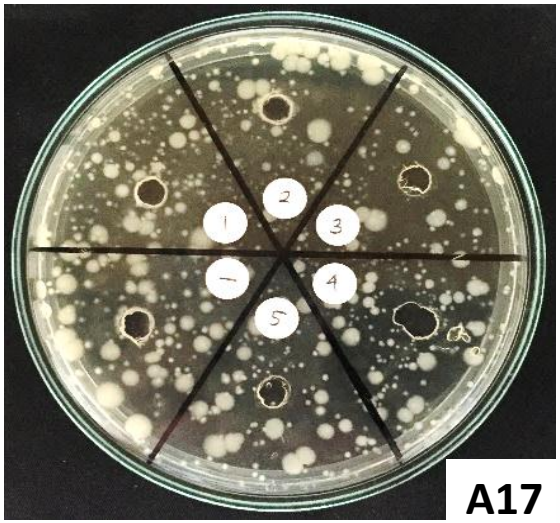
Whey + glukosa + trypton → Isolate A10, A17 (*Lb. fermentum 1*),

Trypton → kaya asam amino dan mempunyai rantai peptida pendek → mempercepat produksi bakeriosin



A10



A17

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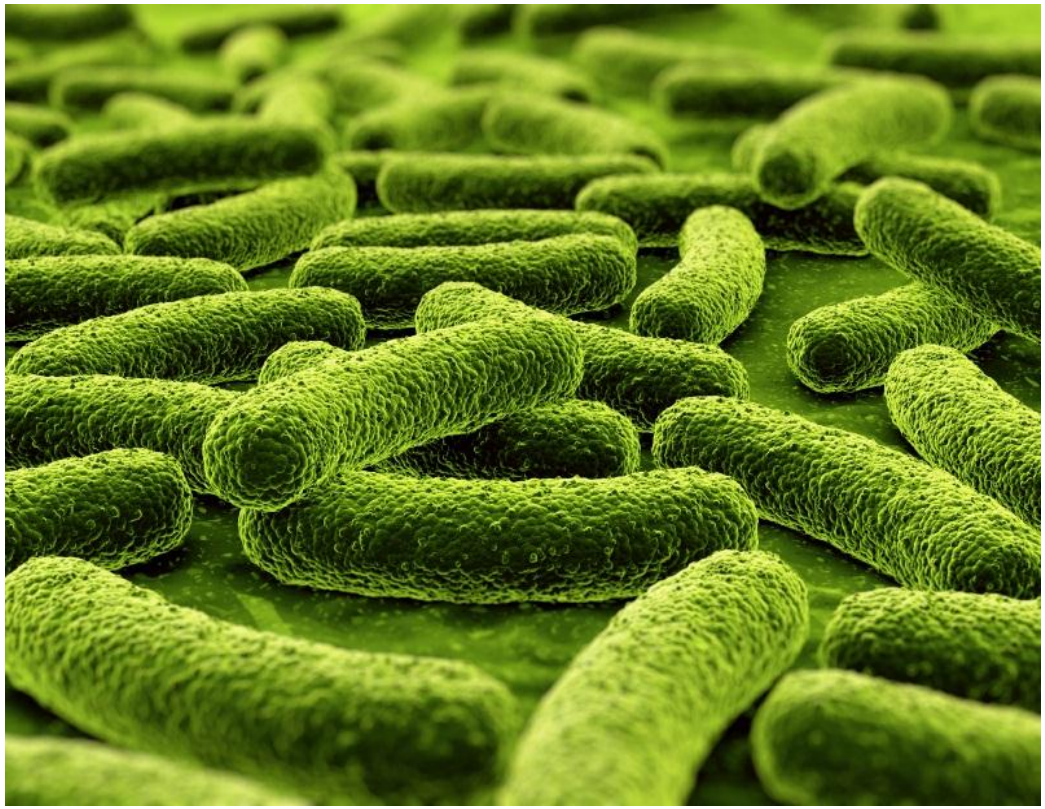
Whey + glukosa + ekstrak yeast extract → ✕

Ekstrak Yeast → dapat menyebabkan deaktivasi Bakteriosin, sumber asam amino, peptida, nukleotida



NutraIngredients-USA.com

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Beberapa isolat

- ✕ aktivitas bakteriosin
- ↓ aktivitas bakteriosin

Setiap isolat mempunyai suhu optimal dan waktu yang berbeda untuk menghasilkan bakteriosin. Suhu 37°C dan waktu 24 jam ≠ optimal untuk menghasilkan bakteriosin.

Hasil Identifikasi API Software (inkubasi 24 jam)

Isolate Code	Species Identification	Significant (%)	Remarks
A8	*Lactobacillus pentosus*	97.3	Good identification
A13	-	-	-
A14	*Lactobacillus fermentum 1*	99.8	Very good identification
A17	*Lactobacillus fermentum 1*	99.8	Very good identification
A18	*Lactobacillus fermentum 1*	99.9	Very good identification
A22	*Lactococcus raffinolactis*	99.7	Doubtful profile
A24	*Lactobacillus brevis 1*	60.3	Doubtful profile
B3	*Lactobacillus fermentum 1*	99.8	Very good identification
B9	*Leuconostoc mesenteroides ssp mesenteroides/dextrancium 2*	-	Unacceptable profile

Microbial pathogens and strategies for combating them: science, technology and education (A. Méndez-Vilas, Ed.)

Bacteriocins: Promising Natural Antimicrobials

Medine Güllüce[1], Mehmet Karadayı[1] and Özlem Barış[1]

[1]Molecular Microbiology Group, Bacteriology and Molecular Biology Research Laboratory, Department of Biology, Atatürk University, 25240 Erzurum, Turkey

Bacteriocins are described as ribosomally synthesized small poly peptides that exert antimicrobial effects against closely or non-closely related bacteria. The major producer group for bacteriocins is lactic acid bacteria (LAB) that contain a great variety of microorganisms described as "generally recognized as safe (GRAS)" by the US Food and Drug Administration. Due to this accredited safety potency of their origin and the wide-range effectiveness on pathogenic or spoilage bacteria, bacteriocins have attracted great research interest as natural antimicrobial agents, thereby allowing the design of new technologies for combating microbial pathogens in many industrial applications. For example, bacteriocins play a crucial role in maintaining the food safety and several bacteriocin preparations are commercially available for wide-range applications in the industry.

On the other hand, although many research efforts have been successfully done up to date, it is remarkable that there are still several gaps in this subject. Filling these gaps fundamentally requires a clear understanding on the nature of bacteriocins and carefully considered research strategies. Thus, the present study will include general information about bacteriocins such as definition, origin, nature and more complicated issues including effect mechanisms, application and development strategies.

Keywords bacteriocins; natural antimicrobials; effect mechanism; biopreservative agents

Food Control 32 (2013) 134 142

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journal homepage: www.elsevier.com/locate/foodcont

Review

Novel biotechnological applications of bacteriocins: A review

Eduardo Marcos Balciunas [a], Fabio Andres Castillo Martinez [a], Svetoslav Dimitrov Todorov [b], Bernadette Dora Gombossy de Melo Franco [b], Attilio Converti [c], Ricardo Pinheiro de Souza Oliveira [a,*]

[a] Biochemical and Pharmaceutical Technology Department, Faculty of Pharmaceutical Sciences, University of São Paulo, Av Professor Lineu Prestes 580, São Paulo 05508-900, Brazil
[b] Food and Experimental Nutrition Department, Faculty of Pharmaceutical Sciences, University of São Paulo, São Paulo 05508-900, Brazil
[c] Department of Chemical and Process Engineering, Genoa University, Genoa I-16145, Italy

Advances in Colloid and Interface Science xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

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

J. Burgain [a], J. Scher [a], G. Francius [b], F. Borges [a], M. Corgneau [a], A.M. Revol-Junelles [a], C. Cailliez-Grimal [a], C. Gaiani [a,*]

[a] Université de Lorraine, LIBio, Laboratoire d'Ingénierie des Biomolécules, 2 av de la Forêt de Haye, TSA 40602, 54518 Vandoeuvre lès Nancy, France
[b] Université de Lorraine, LCPME, Laboratoire de Chimie Physique et Microbiologie pour l'Environnement, UMR 7564, 54600 Villers-lès-Nancy, France

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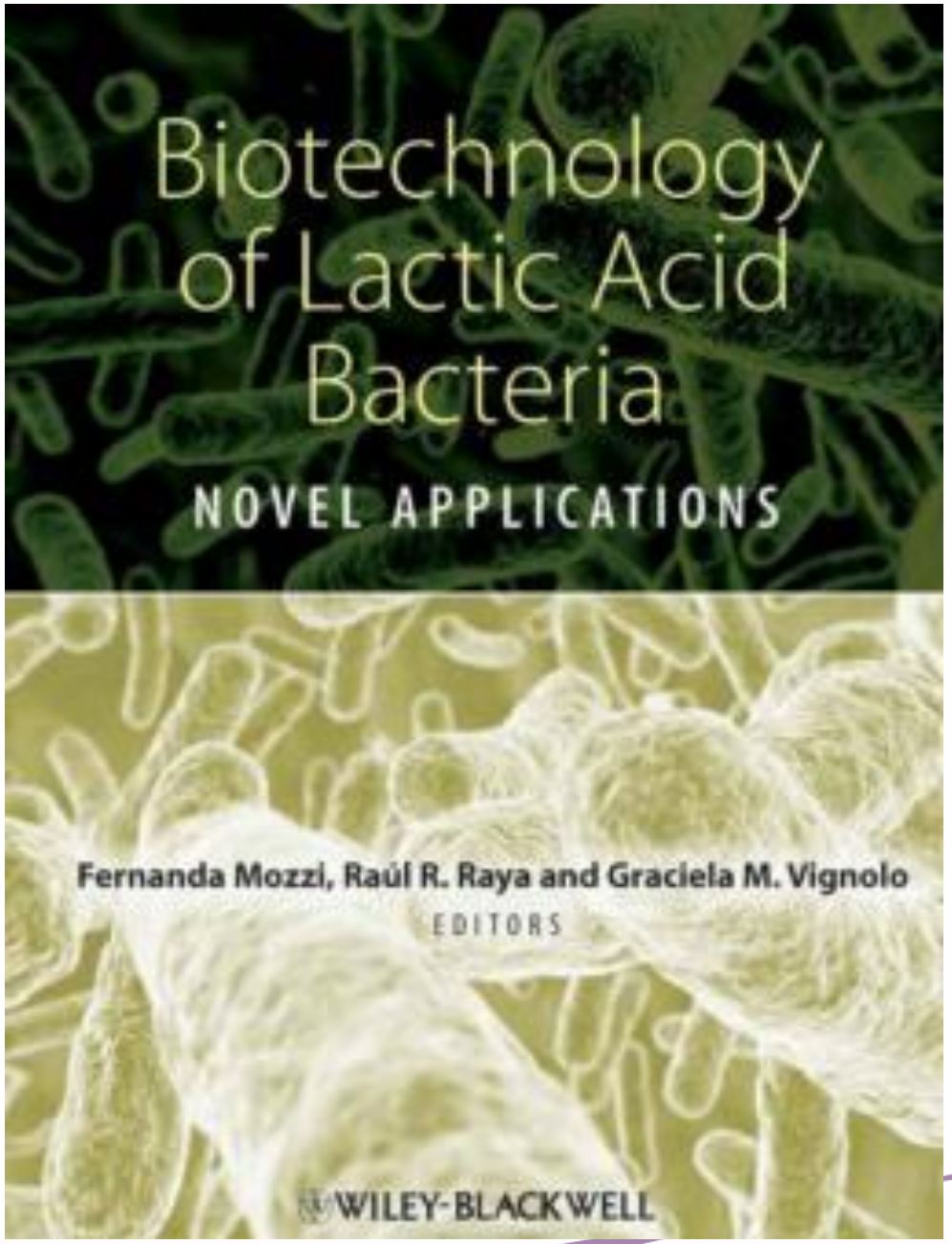

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KESIMPULAN

- Suplementasi sumber karbon dan nitrogen (glukosa, sukrosa, trypton dan ekstrak yeast) dapat menginduksi produksi bakteriosin. Suplemen 2% sukrosa dan 0,8% ekstrak yeast , 1% glukosa dan 2% trypton memberikan hasil yang terbaik.
- Isolat bakteri asam laktat (*Lactobacillus pentosus* pada 2.5% konsentrasi larutan garam, suhu15°C kode A dan *Lactobacillus fermentum* pada 5.0% konsentrasi larutan garam, suhu 30°C kode B menghasilkan bakteriosin yang berpotensi menghambat bakteri patogen.
- *Lactobacillus pentosus* kode A dan *Lactobacillus fermentum* kode B menjanjikan sebagai sumber inokulum minuman probiotik (susu fermentasi).

SARAN

Perlu dilakukan kajian lebih lanjut tentang karakteristik bakteriosin dan optimalisasi produksi bakteriosin dalam skala pilot.

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5

Terima kasih kepada Direktorat Jendral Pendidikan Tinggi untuk Penelitian Unggulan Perguruan Tinggi (PUPT) 2014-2017 (3rd year).

Special thanks to our teams:
Donna Larissa Khuangga
Agatha Putri Algustie,
Agata Apriliana Sundoro

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