

DAFTAR PUSTAKA

- Afiff, F.E. (2017) “Efektivitas Ekstrak Daun Mengkudu (*Morinda citrifolia* L .) Dan Daun Sirih Merah (*Piper crocatum* Ruiz & Pav) Terhadap Zona Hambat Pertumbuhan *Staphylococcus aureus*,” 10(April), pp. 12–16.
- Agroteknologi, P.I. *et al.* (2021) “Sterilisasi peralatan dan media kultur jaringan,” 4(2), pp. 16–19.
- Amenu, D. and Bacha, K. (2023) “Probiotic potential and safety analysis of lactic acid bacteria isolated from Ethiopian traditional fermented foods and beverages,” *Annals of Microbiology* [Preprint]. Available at: <https://doi.org/10.1186/s13213-023-01740-9>.
- Austin, P. *et al.* (2024) “Karakteristik Pencernaan Makanan Fermentasi oleh Bakteri Asam Laktat dan Manfaatnya bagi Kesehatan,” 13(2), pp. 383–389.
- Bintsis, T. (2018) “Lactic acid bacteria as starter cultures : An update in their metabolism and genetics,” 4(November), pp. 665–684. Available at: <https://doi.org/10.3934/microbiol.2018.4.665>.
- Dwinianti, E.F. *et al.* (2025) “Potensi Bakteri Asam Laktat (BAL),” 8(3), pp. 263–278.
- Fachrial, E. and Nugroho, T.T. (2024) “ α -glucosidase Inhibitory Activity of Probiotic Isolate LBSU9 Isolated from Traditional Food ‘ Trites ’ : a Preliminary Study,” 12(4), pp. 138–147.
- Hewani, P., Dan, D. and Review, I.A. (2022) “Produk fermentasi tradisional indonesia berbahan dasar pangan hewani (daging dan ikan): a review 1,” 01(02), pp. 34–48.
- Hossain, K.S. (2022) “B Vitamins and Their Roles in Gut Health.”
- Krausova, G., Hyrslova, I. and Hynstova, I. (2019) “In Vitro Evaluation of Adhesion Capacity , Hydrophobicity , and Auto-Aggregation of Newly Isolated Potential Probiotic Strains.”
- Lee, S. (2023) “New Insights into the Application of Lactic Acid Bacterial Strains in Fermentation 2 . 0,” pp. 4–6.
- Leksono, Ningsih, W. (2024) “Cell Surface and Adherence Properties of Indonesian Indigenous Lactic Acid Bacteria as Probiotic Candidate,” 9(1), pp. 1–11. Available at: <https://doi.org/10.24002/biota.v9i1.8124>.
- Li, J. *et al.* (2023) “Screening and Metabolomic Analysis of Lactic Acid Bacteria-Antagonizing *Pseudomonas aeruginosa*.”
- Liu, Y., Wang, J. and Wu, C. (2021) “Microbiota and Tuberculosis: A Potential Role of Probiotics, and Postbiotics,” *Frontiers in Nutrition*, Volume 8-2021. Available at: <https://www.frontiersin.org/journals/nutrition/articles/10.3389/fnut.2021.6>

26254.

- M.S., K. *et al.* (2023) "Selection methods for probiotic microorganisms with high adhesive properties," *Clinical nutrition and metabolism*, pp. 19–28. Available at: <https://doi.org/10.17816/clinutr321901>.
- Magalhaes, G. De *et al.* (2024) "Bakterias Laticas Como Probioticas, Bioconservantes De Alimentos E Produtoras De Bacteriocinas.," pp. 37–47. Available at: <https://doi.org/10.14295/2238-6416.v79i1.956>.
- Moon, A. *et al.* (2022) "Lactic Acid Bacteria as Mucosal Immunity Enhancers and Antivirals through Oral Delivery," pp. 837–854.
- Nguyen, P. *et al.* (2020) "Exopolysaccharide production by lactic acid bacteria : the manipulation of environmental stresses for industrial applications," 6(September), pp. 451–469. Available at: <https://doi.org/10.3934/microbiol.2020027>.
- Nuraida, L. (2015) "A review : Health promoting lactic acid bacteria in traditional Indonesian fermented foods," *Food Science and Human Wellness*, 4(2), pp. 47–55. Available at: <https://doi.org/10.1016/j.fshw.2015.06.001>.
- Padang, F.K. and Ismail, I. (2023) "Potensi Makanan Fermentasi Tradisional Khas Indonesia Penghasil Bakteri Asam Laktat," 4(1), pp. 1–17.
- Priadi, G. *et al.* (2020) "Studi In Vitro Bakteri Asam Laktat Kandidat probiotik dari Makanan Fermentasi Indonesia [In Vitro Evaluation of Probiotic Candidate Bacteria from Indonesian Food]," 31(1), pp. 21–28. Available at: <https://doi.org/10.6066/jtip.2020.31.1.21>.
- Purba, E.C. and Silalahi, M. (2018) "Gastronomic ethnobiology of ' terites ' d a traditional Batak Karo medicinal food : A ruminant ' s stomach content as a human food resource," *Journal of Ethnic Foods*, 5(2), pp. 114–120. Available at: <https://doi.org/10.1016/j.jef.2018.06.002>.
- Salt, B. *et al.* (2019) "Ketahanan Bakteri Asam Laktat Asal Saluran Pencernaan Broiler Terhadap pH dan Garam Empedu," 5, pp. 27–37.
- Samedi, L. and Charles, A.L. (2019) "Evaluation of Technological and Probiotic Abilities of Local Lactic Acid Bacteria," 7(1), pp. 9–19. Available at: <https://doi.org/10.12691/jaem-7-1-3>.
- Sarita, B. and Kovaleva, E.G. (2025) "A comprehensive review of probiotics and human health-current prospective and applications," (January), pp. 1–14. Available at: <https://doi.org/10.3389/fmicb.2024.1487641>.
- Sembiring, F. *et al.* (2024) "Multidrug-resistant Escherichia coli and its role in stunting : evidence from a cross- sectional study in Indonesia." Available at: <https://doi.org/10.3855/jidc.21502>.
- Surono, I.S. *et al.* (2021) "Gut microbiota profile of Indonesian stunted children and children with normal nutritional status," *PLOS ONE*, 16(1), p. e0245399. Available at: <https://doi.org/10.1371/journal.pone.0245399>.

Lampiran 1 Surat Izin Penelitian



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Nomor : KH.02.04/F.XXII.12/ 43 /2026
 Perihal : Izin Penelitian

19 Januari 2026

Kepada Yth :
 Direktur Poltekkes Kemenkes Medan
 Di –
 Tempat

Dengan ini kami sampaikan, dalam rangka penulisan Karya Tulis Ilmiah untuk memenuhi persyaratan Ujian Akhir Program (UAP) Jurusan Teknologi Laboratorium Medis diperlukan penelitian.

Dalam hal ini kami mohon, kiranya Bapak / Ibu bersedia memberi kemudahan terhadap mahasiswa/i kami.

No	Nama	NIM	Judul Penelitian
1	Ruth Sevel Napitupulu	P07534023225	Uji Aktivitas Antimikroba Bakteri Asam Laktat (BAL) dari pangan tradisional khas batak toba Naniura dalam menghambat pertumbuhan bakteri
2	Rahmaini Syahputri Siregar	P07534023082	Uji Biofilm Bakteri Asam Laktat pada makanan fermentasi Naniura dan Trites
3	Putra Dianto	P07534023039	Perbedaan Kemampuan Aktivitas Antimikroba Bakteri Asam Laktat Diisolasi Dari Trites
4	Aimun Permata Sari	P07534023190	Uji Efektifitas Anti Jamur Pada Ekstrak Kulit Pisang Barangan (Musa acuminata Linn.) Dalam Menghambat Pertumbuhan Jamur Candida Albicans
5	Nadila Alfiona	P07534023121	Efektifitas ekstrak kulit jeruk nipis (Citrus aurantifolia) Sebagai antibakteri terhadap pertumbuhan Staphylococcus aureus
6	Evelyn gracia Br samosir	P07534023111	Efektifitas ekstrak kulit jeruk kalamansi (Citrus microcarpa) sebagai antibakteri terhadap pertumbuhan Staphylococcus aureus
7	Ayu Stevani Nainggolan	P07534023200	Uji Auto-Agregasi Bakteri Asam Laktat (BAL) Isolat dari Naniura dan Trites
8	Aulia Ananta Hsb	P07534023146	Uji Aktivitas antibakteri ekstrak etanol bawang putih terhadap bakteri Staphylococcus aureus
9	Jihan fadilah sari	P07534023026	Uji aktivitas antibakteri ekstrak etanol bawang putih terhadap bakteri Escherichia coli
10	Seila Oktarisa	P07534023227	Perbandingan Kadar Flavonoid Ekstrak Sirih Hijau Dan Sirih Merah Dengan Metode Spektrofotometri Uv-Vis
11	Erni Anisa Sembiring	P07534023109	Analisa kadar vitamin C pada kulit jeruk manis(Citrus sinensis)dengan metode spektrofotometri UV-Vis



Dokumen ini telah ditandatangani secara elektronik menggunakan sertifikat elektronik yang diterbitkan oleh Balai Besar Sertifikasi Elektronik (BSrE), Badan Siber dan Sandi Negara

No	Nama	NIM	Judul Penelitian
12	Anisa Anggraini	P07534023122	Perbandingan kadar vitamin C pada bunga telang (<i>Clitoria ternatea</i>) segar dan kering dengan metode titrasi iodimetri
13	Ica Ariqah	P07534023024	Efektivitas Ekstrak Kulit Jeruk Lemon Sebagai Antibakteri Pertumbuhan <i>Staphylococcus aureus</i>
14	Osma Hutriawani Sinaga	P07534023219	Perbandingan Kadar Vitamin C Pada Bunga Telang Segar Dan Kering (<i>Clitoria ternatea</i> L.) Dengan Metode Spektrofotometri UV-VIS
15	Adelia Salsabila	P07534023140	Uji efektivitas antifungal bakteri asam laktat asal feses luwak <i>paradoxurus Hermaphroditus</i> terhadap pertumbuhan jamur <i>candida albicans</i>
16	Nabila anggraini	P07534023030	Uji efektivitas antifungal bakteri asam laktat asal feses luwak <i>paradoxurus Hermaphroditus</i> terhadap pertumbuhan jamur <i>Aspergillus flavus</i>
17	Citra Dewi	P07534023014	Isolasi dan Uji Resistensi Antibiotik terhadap Bakteri <i>Escherichia coli</i> dari Sungai Deli Kota Medan
18	Salsyach biela	P07534023043	Isolasi dan uji resistensi antibiotik pada bakteri coliform dari air sungai deli kota medan
19	Yun Kristiani.S	P07534023187	Efektivitas ekstrak daun jeruk purut (<i>citrus hystrix</i> sebagai antibakteri terhadap pertumbuhan <i>staphylococcus aureus</i>
20	Muhammad Akbar	P07534023076	Efektivitas ekstrak kulit jeruk manis (<i>citrus sinensis</i>) sebagai antibakteri terhadap pertumbuhan <i>staphylococcus aureus</i>
21	Ressy Heryati	P07534023220	Uji aktivitas antibakteri spray hand sanitizier ekstrak daun sirih (<i>piper betel</i> L.) terhadap bakteri <i>staphylococcus aureus</i>
22	Irdina Lyra Mahfuzah	P07534023209	Uji Aktivitas Antibakteri Ekstrak Daun Jambu Biji (<i>Psidium guajava</i>) Terhadap Bakteri <i>Salmonella</i> sp. Dan <i>Escherichia coli</i> .
23	Yolanda Aulia	P07534023045	Uji efektivitas kombinasi ekstrak daun pepaya (<i>carica papaya</i> L.) dan daun kemangi (<i>ocimum basilicum</i> L.) sebagai antibakteri terhadap <i>staphylococcus aureus</i>
24	Gilbert Emmanuel Simanjuntak	P07534023157	Perbandingan Pertumbuhan <i>Escherichia coli</i> Pada Berbagai Konsentrasi Air Kelapa (<i>Cocos nucifera</i> L.) Dengan MacConkey Agar
25	Meirisa fibri	P07534023167	Kadar vitamin C pada fermentasi Bunga Telang hari 1,3, dan 5 dengan metode Spektrofotometri UV-Vis
26	Ribby Lyona Chandra	P07534023129	Efektivitas air rebusan daun sirih terhadap pertumbuhan bakteri <i>e coli</i>
27	Aprianti Br Purba	P07534023144	Deteksi bakteriuria pada ibu hamil menggunakan dipstick urin dan konfirmasi dengan metode kultur

No	Nama	NIM	Judul Penelitian
28	Dwi Damayanti Pasaribu	P07534023122	Deteksi proteinuria pada ibu hamil sebagai indikator preeklamsia
29	Imelda Gisela Fransiska Br. Singarimbun	P07534023025	Perbandingan Kadar Vitamin C pada Buah dan Kulit Pisang Barangan dengan Metode Spektrofotometri UV-Vis
30	Putri Khadijah	P07534023175	Perbandingan Pertumbuhan Bakteri Infeksi Saluran Kemih (ISK) dengan menggunakan media MacConkey Agar dan media Ekstak Biji Saga
31	Aliya Dea Husni	P07534023095	Deskripsi Visualisasi Eritrosit Leukosit dan Trombosit pada pewarnaan sediaan apus darah tepi (SADT) menggunakan ekstrak bunga telang (<i>Clitoria ternatea</i>)
32	Nur Shella Intan Swastani	P07534023125	Isolasi dan Uji Biofilm Bakteri <i>Escherichia coli</i> di Sungai Deli Kota Medan
33	Tiara Mahdani Putri	P07534023232	Uji Daya Hambat Ekstrak Lidah Biaya Terhadap Pertumbuhan <i>Streptococcus</i> sp
34	M.Iqbal Chairiyal Kurnia	P07534023166	Uji kadar asam salisilat pada bedak bayi menggunakan metode Spektrofotometri Uv-Vis
35	Sesania Saulina Siregar	P07534023228	Perbandingan Kadar Senyawa Flavonoid Pada Buah Pare Biasa dan Buah Pare Hutan Dengan Metode Spektrofotometri UV-VIS
36	Sofiatul Isnaini Huzali	P07534023135	Deskripsi Visualisasi Eritrosit Leukosit dan Trombosit Pada Sediaan Apusan Darah Tepi (SADT) menggunakan ekstrak Bunga Kencana Ungu (<i>Ruellia Simplex</i>)
37	Niken Br Lubis	P07534023123	Deskripsi Visualisasi Eritrosit, Leukosit Dan Trombosit Pada Sediaan Apusan Darah Tepi (SadT) Dengan Ekstrak Bunga Kamboja (<i>Plumeria rubra</i> L. cv. <i>Acutifolia</i>)
38	Dhea Patricia Simanjuntak	P07534023104	Deskripsi Visualisasi Eritrosit, Leukosit Dan Trombosit Pada Sediaan Apusan Darah Tepi (SadT) Dengan Ekstrak Ubi Ungu (<i>Ipomea batatas</i> L.)
39	Indri Kusmaningtias	P07534023114	Identifikasi bakteri <i>Staphylococcus aureus</i> pada susu kambing peranakan etawa di kota binjai

Untuk izin Penelitian di Laboratorium Terpadu Poltekkes Kemenkes Medan . Hal-hal yang berhubungan dengan kegiatan tersebut adalah tanggung jawab mahasiswa/i.

Demikianlah surat ini disampaikan, atas bantuan dan kerjasama yang baik diucapkan terima kasih.



Ketua Jurusan TLM

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Lampiran 2 Perhitungan Persentase Autoagregasi

a. Persentase autoagregasi 1 jam

(Ulangan 1)

$$\begin{aligned} A01 &= \frac{0.498 - 0.473}{0.498} \times 100\% \\ &= \frac{0.025}{0.498} \times 100\% \\ &= 5.02 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned} A01 &= \frac{0.498 - 0.461}{0.498} \times 100\% \\ &= \frac{0.037}{0.498} \times 100\% \\ &= 7.43 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned} A01 &= \frac{0.498 - 0.464}{0.498} \times 100\% \\ &= \frac{0.034}{0.498} \times 100\% \\ &= 6.83 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned} A05 &= \frac{0.534 - 0.488}{0.534} \times 100\% \\ &= \frac{0.046}{0.534} \times 100\% \\ &= 8.61 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned} A05 &= \frac{0.534 - 0.471}{0.534} \times 100\% \\ &= \frac{0.063}{0.534} \times 100\% \\ &= 11.80 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned} A05 &= \frac{0.534 - 0.495}{0.534} \times 100\% \\ &= \frac{0.039}{0.534} \times 100\% \\ &= 7.30 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned} A07 &= \frac{0.535 - 0.511}{0.535} \times 100\% \\ &= \frac{0.024}{0.535} \times 100\% \\ &= 4.49 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned} A07 &= \frac{0.535 - 0.504}{0.535} \times 100\% \\ &= \frac{0.031}{0.535} \times 100\% \\ &= 5.79 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 A07 &= \frac{0.535 - 0.505}{0.535} \times 100\% \\
 &= \frac{0.03}{0.535} \times 100 \% \\
 &= 5.61
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B18 &= \frac{0.515 - 0.494}{0.515} \times 100\% \\
 &= \frac{0.021}{0.515} \times 100 \% \\
 &= 4.08
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B18 &= \frac{0.515 - 0.475}{0.515} \times 100\% \\
 &= \frac{0.04}{0.515} \times 100 \% \\
 &= 7.77
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B18 &= \frac{0.515 - 0.494}{0.515} \times 100\% \\
 &= \frac{0.021}{0.515} \times 100 \% \\
 &= 4.08
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B20 &= \frac{0.498 - 0.485}{0.498} \times 100\% \\
 &= \frac{0.013}{0.498} \times 100 \% \\
 &= 2.61
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B20 &= \frac{0.498 - 0.481}{0.498} \times 100\% \\
 &= \frac{0.017}{0.498} \times 100 \% \\
 &= 3.41
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B20 &= \frac{0.498 - 0.493}{0.498} \times 100\% \\
 &= \frac{0.005}{0.498} \times 100 \% \\
 &= 1.00
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B34 &= \frac{0.540 - 0.534}{0.540} \times 100\% \\
 &= \frac{0.006}{0.540} \times 100 \% \\
 &= 1.11
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B34 &= \frac{0.540 - 0.531}{0.540} \times 100\% \\
 &= \frac{0.009}{0.540} \times 100 \% \\
 &= 1.67
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B34 &= \frac{0.540 - 0.530}{0.540} \times 100\% \\
 &= \frac{0.01}{0.540} \times 100 \% \\
 &= 1.85
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B36 &= \frac{0.512 - 0.446}{0.512} \times 100\% \\
 &= \frac{0.066}{0.512} \times 100\% \\
 &= 12.89
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B36 &= \frac{0.512 - 0.438}{0.512} \times 100\% \\
 &= \frac{0.066}{0.512} \times 100\% \\
 &= 14.45
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B36 &= \frac{0.512 - 0.443}{0.512} \times 100\% \\
 &= \frac{0.069}{0.512} \times 100\% \\
 &= 13.48
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B39 &= \frac{0.550 - 0.541}{0.550} \times 100\% \\
 &= \frac{0.009}{0.550} \times 100\% \\
 &= 1.64
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B39 &= \frac{0.550 - 0.537}{0.550} \times 100\% \\
 &= \frac{0.013}{0.550} \times 100\% \\
 &= 2.36
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B39 &= \frac{0.550 - 0.543}{0.550} \times 100\% \\
 &= \frac{0.007}{0.550} \times 100\% \\
 &= 1.27
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B42 &= \frac{0.515 - 0.493}{0.515} \times 100\% \\
 &= \frac{0.022}{0.515} \times 100\% \\
 &= 4.27
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B42 &= \frac{0.515 - 0.510}{0.515} \times 100\% \\
 &= \frac{0.005}{0.515} \times 100\% \\
 &= 0.97
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 TP39 &= \frac{0.528 - 0.487}{0.528} \times 100\% \\
 &= \frac{0.041}{0.528} \times 100\% \\
 &= 7.77
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 TP39 &= \frac{0.528 - 0.499}{0.528} \times 100\% \\
 &= \frac{0.029}{0.528} \times 100\% \\
 &= 5.49
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 TP39 &= \frac{0.528 - 0.488}{0.528} \times 100\% \\
 &= \frac{0.04}{0.528} \times 100\% \\
 &= 7.58
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 TP86 &= \frac{0.548 - 0.538}{0.548} \times 100\% \\
 &= \frac{0.01}{0.548} \times 100\% \\
 &= 1.82
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 TP86 &= \frac{0.548 - 0.537}{0.548} \times 100\% \\
 &= \frac{0.011}{0.548} \times 100\% \\
 &= 2.01
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 TP86 &= \frac{0.548 - 0.538}{0.548} \times 100\% \\
 &= \frac{0.01}{0.548} \times 100\% \\
 &= 1.82
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 TP106 &= \frac{0.515 - 0.495}{0.515} \times 100\% \\
 &= \frac{0.02}{0.515} \times 100\% \\
 &= 3.88
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 TP106 &= \frac{0.515 - 0.509}{0.515} \times 100\% \\
 &= \frac{0.006}{0.515} \times 100\% \\
 &= 1.17
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 TP106 &= \frac{0.515 - 0.488}{0.515} \times 100\% \\
 &= \frac{0.027}{0.515} \times 100\% \\
 &= 5.24
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 TP121 &= \frac{0.518 - 0.473}{0.518} \times 100\% \\
 &= \frac{0.045}{0.518} \times 100\% \\
 &= 8.69
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 TP121 &= \frac{0.518 - 0.464}{0.518} \times 100\% \\
 &= \frac{0.054}{0.518} \times 100\% \\
 &= 10.42
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 TP121 &= \frac{0.518 - 0.444}{0.518} \times 100\% \\
 &= \frac{0.074}{0.518} \times 100\% \\
 &= 14.29
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 \text{S. aureus} &= \frac{0.498 - 0.469}{0.498} \times 100\% \\
 &= \frac{0.029}{0.498} \times 100\% \\
 &= 5.82
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 \text{S. aureus} &= \frac{0.498 - 0.482}{0.498} \times 100\% \\
 &= \frac{0.016}{0.498} \times 100\% \\
 &= 3.21
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 \text{S. aureus} &= \frac{0.498 - 0.477}{0.498} \times 100\% \\
 &= \frac{0.021}{0.498} \times 100\% \\
 &= 4.22
 \end{aligned}$$

b. Persentase Autoagregasi 2 jam

(Ulangan 1)

$$\begin{aligned}
 A01 &= \frac{0.498 - 0.415}{0.498} \times 100\% \\
 &= \frac{0.083}{0.498} \times 100\% \\
 &= 17.00
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 A01 &= \frac{0.498 - 0.417}{0.498} \times 100\% \\
 &= \frac{0.081}{0.498} \times 100\% \\
 &= 16.27
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 A01 &= \frac{0.498 - 0.418}{0.498} \times 100\% \\
 &= \frac{0.08}{0.498} \times 100\% \\
 &= 16.06
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 A05 &= \frac{0.534 - 0.426}{0.534} \times 100\% \\
 &= \frac{0.108}{0.534} \times 100\% \\
 &= 20.00
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 A05 &= \frac{0.534 - 0.429}{0.534} \times 100\% \\
 &= \frac{0.105}{0.534} \times 100\% \\
 &= 19.66
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 A05 &= \frac{0.534 - 0.418}{0.534} \times 100\% \\
 &= \frac{0.116}{0.534} \times 100\% \\
 &= 21.72
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 A07 &= \frac{0.535 - 0.471}{0.535} \times 100\% \\
 &= \frac{0.118}{0.535} \times 100\% \\
 &= 12.00
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 A07 &= \frac{0.535 - 0.480}{0.535} \times 100\% \\
 &= \frac{0.055}{0.535} \times 100\% \\
 &= 10.28
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 A07 &= \frac{0.535 - 0.470}{0.535} \times 100\% \\
 &= \frac{0.065}{0.535} \times 100\% \\
 &= 12.15
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B18 &= \frac{0.515 - 0.464}{0.515} \times 100\% \\
 &= \frac{0.051}{0.515} \times 100\% \\
 &= 9.90
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B18 &= \frac{0.515 - 0.474}{0.515} \times 100\% \\
 &= \frac{0.041}{0.515} \times 100\% \\
 &= 7.96
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B18 &= \frac{0.515 - 0.467}{0.515} \times 100\% \\
 &= \frac{0.048}{0.515} \times 100\% \\
 &= 9.32
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B20 &= \frac{0.498 - 0.473}{0.498} \times 100\% \\
 &= \frac{0.025}{0.498} \times 100\% \\
 &= 5,02
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B20 &= \frac{0.498 - 0.444}{0.498} \times 100\% \\
 &= \frac{0.054}{0.498} \times 100\% \\
 &= 10,84
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B20 &= \frac{0.498 - 0.440}{0.498} \times 100\% \\
 &= \frac{0.058}{0.498} \times 100\% \\
 &= 11.65
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B34 &= \frac{0.540 - 0.518}{0.540} \times 100\% \\
 &= \frac{0.022}{0.540} \times 100\% \\
 &= 4.07
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B34 &= \frac{0.540 - 0.500}{0.540} \times 100\% \\
 &= \frac{0.04}{0.540} \times 100\% \\
 &= 7,41
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B34 &= \frac{0.540 - 0.502}{0.540} \times 100\% \\
 &= \frac{0.038}{0.540} \times 100\% \\
 &= 7,04
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B36 &= \frac{0.512 - 0.411}{0.512} \times 100\% \\
 &= \frac{0.101}{0.512} \times 100\% \\
 &= 19,73
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B36 &= \frac{0.512 - 0.383}{0.512} \times 100\% \\
 &= \frac{0.129}{0.512} \times 100\% \\
 &= 25.20
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B36 &= \frac{0.512 - 0.379}{0.512} \times 100\% \\
 &= \frac{0.133}{0.512} \times 100\% \\
 &= 25.98
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B39 &= \frac{0.550 - 0.509}{0.550} \times 100\% \\
 &= \frac{0.041}{0.550} \times 100\% \\
 &= 7.45
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B39 &= \frac{0.550 - 0.520}{0.550} \times 100\% \\
 &= \frac{0.03}{0.550} \times 100\% \\
 &= 5.45
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 B39 &= \frac{0.550 - 0.511}{0.550} \times 100\% \\
 &= \frac{0.039}{0.550} \times 100\% \\
 &= 7.09
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 B42 &= \frac{0.515 - 0.433}{0.515} \times 100\% \\
 &= \frac{0.082}{0.515} \times 100\% \\
 &= 15,92
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 B42 &= \frac{0.515 - 0.425}{0.515} \times 100\% \\
 &= \frac{0.09}{0.515} \times 100\% \\
 &= 17.48
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned} B42 &= \frac{0.515 - 0.444}{0.515} \times 100\% \\ &= \frac{0.071}{0.515} \times 100\% \\ &= 13.79 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned} TP39 &= \frac{0.528 - 0.462}{0.528} \times 100\% \\ &= \frac{0.066}{0.528} \times 100\% \\ &= 12,50 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned} TP39 &= \frac{0.528 - 0.447}{0.528} \times 100\% \\ &= \frac{0.081}{0.528} \times 100\% \\ &= 15.34 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned} TP39 &= \frac{0.528 - 0.461}{0.528} \times 100\% \\ &= \frac{0.067}{0.528} \times 100\% \\ &= 12.69 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned} TP86 &= \frac{0.548 - 0.513}{0.548} \times 100\% \\ &= \frac{0.035}{0.548} \times 100\% \\ &= 6.40 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned} TP86 &= \frac{0.548 - 0.517}{0.548} \times 100\% \\ &= \frac{0.031}{0.548} \times 100\% \\ &= 5.66 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned} TP86 &= \frac{0.548 - 0.518}{0.548} \times 100\% \\ &= \frac{0.03}{0.548} \times 100\% \\ &= 5.47 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 \text{TP106} &= \frac{0.515 - 0.493}{0.515} \times 100\% \\
 &= \frac{0.022}{0.515} \times 100\% \\
 &= 4.30
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 \text{TP106} &= \frac{0.515 - 0.474}{0.515} \times 100\% \\
 &= \frac{0.041}{0.515} \times 100\% \\
 &= 7.96
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 \text{TP106} &= \frac{0.515 - 0.469}{0.515} \times 100\% \\
 &= \frac{0.046}{0.515} \times 100\% \\
 &= 8.93
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 \text{TP121} &= \frac{0.518 - 0.405}{0.518} \times 100\% \\
 &= \frac{0.113}{0.518} \times 100\% \\
 &= 22.00
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 \text{TP121} &= \frac{0.518 - 0.414}{0.518} \times 100\% \\
 &= \frac{0.104}{0.518} \times 100\% \\
 &= 20.08
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 \text{TP121} &= \frac{0.518 - 0.394}{0.518} \times 100\% \\
 &= \frac{0.124}{0.518} \times 100\% \\
 &= 23.94
 \end{aligned}$$

(Ulangan 1)

$$\begin{aligned}
 \text{S. aureus} &= \frac{0.498 - 0.459}{0.498} \times 100\% \\
 &= \frac{0.039}{0.498} \times 100\% \\
 &= 7.80
 \end{aligned}$$

(Ulangan 2)

$$\begin{aligned}
 \text{S. aureus} &= \frac{0.498 - 0.468}{0.498} \times 100\% \\
 &= \frac{0.03}{0.498} \times 100\% \\
 &= 6.02
 \end{aligned}$$

(Ulangan 3)

$$\begin{aligned}
 \text{S. aureus} &= \frac{0.498 - 0.457}{0.498} \times 100\% \\
 &= \frac{0.041}{0.498} \times 100\% \\
 &= 8.23
 \end{aligned}$$

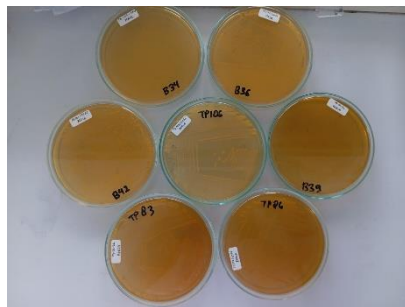
Lampiran 3 Dokumentasi Penelitian



Menimbang media MRSA dan MRSB



Memasak media



Peremajaan BAL pertama



Peremajaan BAL kedua



Seed culture (SC)



Production culture (PC)



Inkubasi SC dan PC



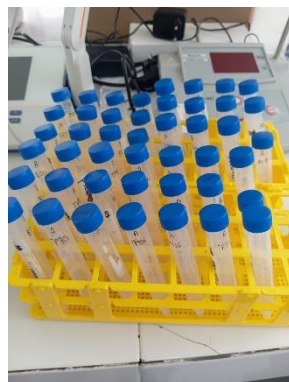
Centrifuge production culture



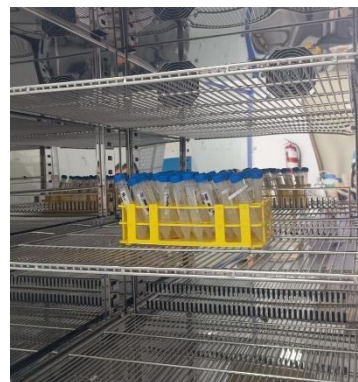
Pencucian pelet dengan larutan PBS



Pengukuran OD sebelum inkubasi



Pembagian suspensi untuk 1 dan 2 jam



Inkubasi 1 dan 2 jam



Pengukuran OD setelah inkubasi



Lampiran 4 Ethical-Exemption



**Kemenkes
Poltekkes Medan**

**Kementerian Kesehatan
Poltekkes Medan**
Komisi Etik Penelitian Kesehatan

📍 Jalan Jamin Ginting KM. 13,5
Medan, Sumatera Utara 20137
☎ (061) 8368633
🌐 <https://poltekkes-medan.ac.id>

KETERANGAN LAYAK ETIK
DESCRIPTION OF ETHICAL EXEMPTION
"ETHICAL EXEMPTION"

No.01.26.2786/KEPK/POLTEKKES KEMENKES MEDAN 2026

Protokol penelitian versi 1 yang diusulkan oleh :
The research protocol proposed by

Peneliti utama : Ayu Stevani Nainggolan
Principal In Investigator

Nama Institusi : Poltekkes Kemenkes Medan
Name of the Institution

Dengan judul:
Title

"Uji Auto Agregasi Bakteri Asam Laktat (BAL) Isolat Dari Naniura Dan Trites"
"Autoaggregation Test of Lactic Acid Bacteria (LAB) Isolates from Naniura and Trites"

Dinyatakan layak etik sesuai 7 (tujuh) Standar WHO 2011, yaitu 1) Nilai Sosial, 2) Nilai Ilmiah, 3) Pemerataan Beban dan Manfaat, 4) Risiko, 5) Bujukan/Eksploitasi, 6) Kerahasiaan dan Privacy, dan 7) Persetujuan Setelah Penjelasan, yang merujuk pada Pedoman CIOMS 2016. Hal ini seperti yang ditunjukkan oleh terpenuhinya indikator setiap standar.

Declared to be ethically appropriate in accordance to 7 (seven) WHO 2011 Standards, 1) Social Values, 2) Scientific Values, 3) Equitable Assessment and Benefits, 4) Risks, 5) Persuasion/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Consent, referring to the 2016 CIOMS Guidelines. This is as indicated by the fulfillment of the indicators of each standard.

Pernyataan Laik Etik ini berlaku selama kurun waktu tanggal 21 Mei 2026 sampai dengan tanggal 21 Mei 2027.

This declaration of ethics applies during the period May 21, 2026 until May 21, 2027.



May 21, 2026
Chairperson,



Dr. Lestari Rahmah, MKT

Lampiran 5 Kartu Bimbingan


Kementerian Kesehatan
Direktorat Jenderal
Sumber Daya Manusia Kesehatan

Politeknik Kesehatan Medan

Jalan Jamin Ginting KM. 13,5

Medan, Sumatera Utara 20136

(061) 8368633

<https://poltekkes-medan.ac.id>
PRODI D-III JURUSAN TEKNOLOGI LABORATORIUM MEDIS
POLTEKKES KEMENKES MEDAN
KARTU BIMBINGAN KARYA TULIS ILMIAH

T.A 2026

NAMA : Ayu Stevani Nainggolan
NIM : P07534023200
NAMA DOSEN PEMBIMBING : Febri Sembiring, S.Si, M.Si
JUDUL KTI : Uji Autoagregasi Bakteri Asam Laktat (BAL)
 Isolat dari Naniura dan Trites

No	Hari/Tanggal Bimbingan	Materi Bimbingan	Paraf Dosen Pembimbing
1.	Senin, 19 Januari 2026	Pengajuan Judul	
2.	Selasa, 27 Januari 2026	ACC Judul	
3.	Kamis, 5 Februari 2026	Bimbingan Bab I	
4.	Rabu, 11 Februari 2026	Revisi Bab I	
5.	Jumat, 20 Februari 2026	Bimbingan Bab II-III	
6.	Selasa, 10 Maret 2026	Revisi Bab II-III	
7.	Senin, 30 Maret 2026	Revisi Bab II-III	
8.	Selasa, 7 April 2026	ACC Proposal	
9.	Rabu, 15 April 2026	Bimbingan Bab IV-V	
10.	Jumat, 8 Mei 2026	Revisi Bab IV-V	
11.	Kamis, 21 Mei 2026	Revisi Bab IV-V	
12.	Rabu, 3 Juni 2026	ACC KTI	



Nita Andriani Lubis S.Si, M.Biomed
 NIP.198012242009122001

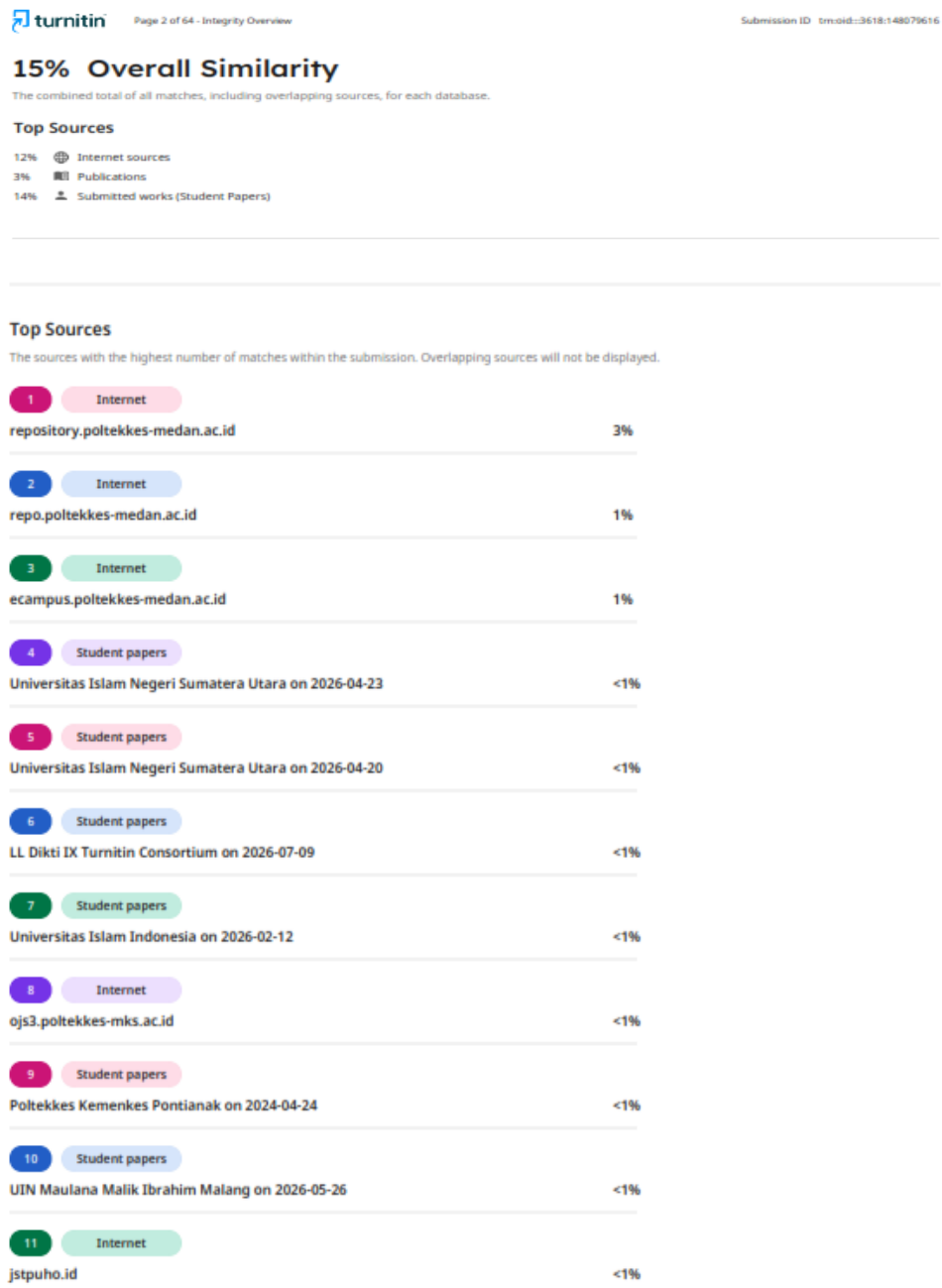
Medan, 3 Juni 2026
 Dosen Pembimbing

Febri Sembiring, S.Si, M.Si
 NIP. 198109172012122001



Dokumen ini telah ditandatangani secara elektronik menggunakan sertifikat elektronik yang diterbitkan oleh Balai Besar Sertifikasi Elektronik (BSrE), Badan Siber dan Sandi Negara

Lampiran 6 Hasil Turnitin



12	Student papers	Badan PPSDM Kesehatan Kementerian Kesehatan on 2025-08-22	<1%
13	Student papers	Universitas Sumatera Utara on 2026-06-15	<1%
14	Student papers	University of Teesside on 2023-01-10	<1%
15	Internet	journal.umpr.ac.id	<1%
16	Internet	scholar.unand.ac.id	<1%
17	Internet	text-id.123dok.com	<1%
18	Student papers	Badan PPSDM Kesehatan Kementerian Kesehatan on 2025-07-16	<1%
19	Publication	Widya Paramita Lokapirnasari, Oky Setyo Widodo, Emy Koestanti. "Potensi Bakte...	<1%
20	Internet	repository.poltekkes-tjk.ac.id	<1%
21	Internet	eprints.amikom.ac.id	<1%
22	Internet	repository.unhas.ac.id	<1%
23	Student papers	Badan PPSDM Kesehatan Kementerian Kesehatan on 2026-05-07	<1%
24	Student papers	LPPM on 2026-08-10	<1%
25	Internet	eprints.uny.ac.id	<1%