

DAFTAR PUSTAKA

- Abdel-Megeed, R. M. (2021). Probiotics: a Promising Generation of Heavy Metal Detoxification. *Biological Trace Element Research*, 199(6), 2406–2413. <https://doi.org/10.1007/s12011-020-02350-1>
- Afriani, Arnim, Marlida, Y., & Yuherman. (2018). Isolation and characterization of lactic acid bacteria proteases from Bekasam for use as a beef tenderizer. *Pakistan Journal of Nutrition*, 17(8), 361–367. <https://doi.org/10.3923/pjn.2018.361.367>
- Azad, M. A. K., Sarker, M., Li, T., & Yin, J. (2018). Probiotic Species in the Modulation of Gut Microbiota: An Overview. *BioMed Research International*, 2018. <https://doi.org/10.1155/2018/9478630>
- Bagus, W. I. D. A., Wirawan, I. P. G., & Adiartayasa, I. W. (2019). Analisis Homologi Fragmen DNA CVPD r dari Jeruk Kinkit *Trophasia trifolia* Menggunakan BLAST Protein Dan BLAST Nukleotida. *Jurnal Agroekoteknologi Tropika*, 8(4), 381–387.
- Bennani, S., Mchiouer, K., Rokni, Y., & Meziane, M. (2017). Characterisation and Identification of Lactic Acid Bacteria Isolated from Moroccan Raw Cow's Milk. *Journal of Materials and Environmental Sciences*, 8(S), 4934–4944.
- Cho, H. S., Choi, M., Lee, Y., Jeon, H., Ahn, B., Soundrarajan, N., Hong, K., Kim, J. H., & Park, C. (2021). High-quality nucleic acid isolation from hard-to-lyse bacterial strains using pmap-36, a broad-spectrum antimicrobial peptide. *International Journal of Molecular Sciences*, 22(8). <https://doi.org/10.3390/ijms22084149>
- Donkor, E. S. (2013). Sequencing of Bacterial Genomes: Principles and Insights into Pathogenesis and Development of Antibiotics. *Genes*, 4, 556–572. <https://doi.org/10.3390/genes4040556>
- Dumitru, M., Vodnar, D. C., Elemer, S., Ciurescu, G., Habeanu, M., Sorescu, I., Georgescu, S. E., & Dudu, A. (2021). Evaluation of non-encapsulated and microencapsulated lactic acid bacteria. *Applied Sciences (Switzerland)*, 11(21). <https://doi.org/10.3390/app11219867>
- França, L. T. C., Carrilho, E., & Kist, T. B. L. (2002). A review of DNA sequencing techniques. *Quarterly Reviews of Biophysics*, 35(2), 169–200. <https://doi.org/10.1017/S0033583502003797>
- Franco-Duarte, R., Černáková, L., Kadam, S., Kaushik, K. S., Salehi, B., Bevilacqua, A., Corbo, M. R., Antolak, H., Dybka-Stępień, K., Leszczewicz, M., Tintino, S. R., de Souza, V. C. A., Sharifi-Rad, J., Coutinho, H. D. M., Martins, N., & Rodrigues, C. F. (2019). Advances in Chemical and Biological Methods to Identify Microorganisms—From Past to Present. *Microorganisms*, 7(5), 130. <https://doi.org/10.3390/MICROORGANISMS7050130>

- Fredriksson, N. J., Hermansson, M., & Wilén, B. M. (2013). The Choice of PCR Primers Has Great Impact on Assessments of Bacterial Community Diversity and Dynamics in a Wastewater Treatment Plant. *PLoS ONE*, 8(10), 1–20. <https://doi.org/10.1371/journal.pone.0076431>
- Frickmann, H., Dekker, D., Schwarz, N. G., Hahn, A., Boahen, K., Sarpong, N., Adu-Sarkodie, Y., Halbgewachs, E., Marks, F., Von Kalckreuth, V., Poppert, S., Loderstaedt, U., May, J., & Hagen, R. M. (2015). 16SrRNA Gene Sequence-Based Identification of Bacteria in Automatically Incubated Blood Culture Materials from Tropical Sub-Saharan Africa. *PLoS ONE*, 10(8). <https://doi.org/10.1371/JOURNAL.PONE.0135923>
- Fu, L., Song, J., Wang, C., Fu, S., & Wang, Y. (2017). Bifidobacterium infantis potentially alleviates shrimp tropomyosin-induced allergy by tolerogenic dendritic cell-dependent induction of regulatory T cells and alterations in gut microbiota. *Frontiers in Immunology*, 8(NOV), 1–14. <https://doi.org/10.3389/fimmu.2017.01536>
- Gariyban, L., & Avashia, N. (2013). Research Techniques Made Simple: Polymerase Chain Reaction (PCR). *The Journal of Investigative Dermatology*, 133(3), e6. <https://doi.org/10.1038/JID.2013.1>
- Giri Putra, L. A., Yonathan, C. J., Niedhatrata, N. I., Rizka Firdaus, M. H., & Yoewono, J. R. (2020). A review of the development of Polymerase Chain Reaction technique and its uses in Scientific field. *Stannum : Jurnal Sains Dan Terapan Kimia*, 2(1), 14–30. <https://doi.org/10.33019/jstk.v2i1.1619>
- Gupta, N. (2019). DNA extraction and polymerase chain reaction. *Journal of Cytology*, 36(2), 116–117. https://doi.org/10.4103/JOC.JOC_110_18
- Handoyo, D., & Rudiretna, A. (2001). Prinsip umum dan pelaksanaan Polymerase Chain Reaction (PCR). *Unitas*, 9(1), 17–29.
- Harahap, M. R. (2018). Elektroforesis: Analisis Elektronika Terhadap Biokimia Genetika. *CIRCUIT: Jurnal Ilmiah Pendidikan Teknik Elektro*, 2(1), 21–26. <https://doi.org/10.22373/crc.v2i1.3248>
- Haro, G., Iksen, I., & Nasri, N. (2020). Identification, characterization and antibacterial potential of probiotic lactic acid bacteria isolated from naniura (A traditional batak fermented food from carp) against Salmonella typhi. *Rasayan Journal of Chemistry*, 13(1), 464–468. <https://doi.org/10.31788/RJC.2020.1315530>
- Harzallah, D., & Belhadj, H. (2013). Lactic Acid Bacteria as Probiotics: Characteristics, Selection Criteria and Role in Immunomodulation of Human GI Muccosal Barrier. *Lactic Acid Bacteria - R & D for Food, Health and Livestock Purposes*. <https://doi.org/10.5772/50732>
- He, S., Cao, B., Yi, Y., Huang, S., Chen, X., Luo, S., Mou, X., Guo, T., Wang, Y., Wang, Y., & Yang, G. (2022). DNA precipitation revisited: A quantitative analysis. *Nano Select*, 3(3), 617–626. <https://doi.org/10.1002/nano.202100152>

- Husain, D. R., Dwyana, Z., Ambeng, Anggraeni, A., & Sulfahri. (2017). Evaluation of bacteria from *Gallus domesticus* as a potential probiotic in broiler chicks: Effects on growth performance and feed conversion ratio. *International Journal of Poultry Science*, *16*(2), 43–49. <https://doi.org/10.3923/IJPS.2017.43.49>
- Husain, D. R., Gunawan, S., & Sulfahri, S. (2020). Antimicrobial potential of lactic acid bacteria from domestic chickens (*Gallus domesticus*) from south celebes, indonesia, in different growth phases: In vitro experiments supported by computational docking. *Iranian Journal of Microbiology*, *12*(1), 62–69. <https://doi.org/10.18502/ijm.v12i1.2519>
- Huys, G., Botteldoorn, N., Delvigne, F., De Vuyst, L., Heyndrickx, M., Pot, B., Dubois, J. J., & Daube, G. (2013). Microbial characterization of probiotics—Advisory report of the Working Group “8651 Probiotics” of the Belgian Superior Health Council (SHC). *Molecular Nutrition & Food Research*, *57*(8), 1479. <https://doi.org/10.1002/MNFR.201300065>
- Islam, R., Hossain, M. N., Alam, M. K., Uddin, M. E., Rony, M. H., Imran, M. A. S., & Alam, M. F. (2020). Antibacterial Activity of Lactic Acid Bacteria and Extraction of Bacteriocin Protein. *Advances in Bioscience and Biotechnology*, *11*(02), 49–59. <https://doi.org/10.4236/abb.2020.112004>
- J Shetty, P. (2020). The Evolution of DNA Extraction Methods. *American Journal of Biomedical Science & Research*, *8*(1), 39–45. <https://doi.org/10.34297/ajbsr.2020.08.001234>
- Jalil, M. A., SM, M. R., & Hossain, K. M. (2019). Molecular Identification of Lactic Acid Bacteria Isolated From Regional Yoghurt Samples of Bangladesh Using 16S Rdna Sequencing. *Health*, *11*, 12. <https://doi.org/10.23880/apct-16000158>
- Ketchum, R. N., Smith, E. G., Vaughan, G. O., Phippen, B. L., McParland, D., Al-Mansoori, N., Carrier, T. J., Burt, J. A., & Reitzel, A. M. (2018). DNA Extraction Method Plays a Significant Role When Defining Bacterial Community Composition in the Marine Invertebrate *Echinometra mathaei*. *Frontiers in Marine Science*, *5*(July), 1–13. <https://doi.org/10.3389/fmars.2018.00255>
- Mao, Q., Sun, X., Sun, J., Zhang, F., Lv, A., Hu, X., & Guo, Y. (2020). A candidate probiotic strain of *Enterococcus faecium* from the intestine of the crucian carp *Carassius auratus*. *AMB Express*, *10*(1). <https://doi.org/10.1186/s13568-020-00973-0>
- Marchesi, J. R., Sato, T., Weightman, A. J., Martin, T. A., Fry, J. C., Hiom, S. J., & Wade, W. G. (1998). Design and evaluation of useful bacterium-specific PCR primers that amplify genes coding for bacterial 16SrRNA. *Applied and Environmental Microbiology*, *64*(2), 795–799. <https://doi.org/10.1128/aem.64.2.795-799.1998>
- Marlida, Y., Wizna, W., Jamsari, J., Mirzah, M., Adzitey, F., & Huda, N. (2020).

Molecular identification and phylogenetic analysis of GABA-producing lactic acid bacteria isolated from indigenous dadih of West Sumatera , Indonesia [version 3 ; peer review : 2 approved , 1 approved with reservations , 1 not approved] Lili Anggraini. 1–15.

- Messe, Y., Made Budiarsa, I., Abd, &, & Laenggeng, H. (2020). Desain Primer Polymerase Chain Reaction (PCR) secara In Silico untuk Amplifikasi Gen gyrA Extensively Drug Resistant Tuberculosis (XDR-TB). *Journal of Biology Science and Education*, 8(2), 616–622. <https://jurnal.fkip.untad.ac.id/index.php/ejipbiol/article/view/1169>
- Nawaz, N., Wen, S., Wang, F., Nawaz, S., Raza, J., Iftikhar, M., & Usman, M. (2022). *Food Industry*.
- Nurfitri, N., Prasetya, F. S., Riyantini, I., Mulyani, Y., Arsad, S., & Agung, M. U. K. (2019). Study of Symbiont Bacteria of *Acropora digitifera* Coral From Ciletuh Bay, Sukabumi by Using Culture and Molecular Approach. *Omni-Akuatika*, 15(2), 106. <https://doi.org/10.20884/1.oa.2019.15.2.748>
- Olas, B. (2020). Probiotics, Prebiotics and Synbiotics-A Promising Strategy in Prevention and Treatment of Cardiovascular Diseases? *International Journal of Molecular Sciences*, 21(24), 1–15. <https://doi.org/10.3390/IJMS21249737>
- Pradhan, P., & Tamang, J. P. (2019). Phenotypic and Genotypic Identification of Bacteria Isolated From Traditionally Prepared Dry Starters of the Eastern Himalayas. *Frontiers in Microbiology*, 10. <https://doi.org/10.3389/FMICB.2019.02526>
- Praja, R. K., Sukrama, I. D. M., Fatmawati, N. N. D., & Hidayati, W. (2016). Optimasi Duplex PCR untuk Deteksi Simultan Gen Penyandi Faktor Virulensi ompW dan ctxA *Vibrio cholerae*. *Indonesia Medicus Veterinus*, 5(5), 438–445.
- Sari, N., Zainal, & Tahir, M. M. (2020). Isolation and identification lactic acid bacteria of honey-enriched functional beverage from cassava (manihot esculenta) tapai from Sinjai regency. *IOP Conference Series: Earth and Environmental Science*, 575(1). <https://doi.org/10.1088/1755-1315/575/1/012016>
- Septiana Anindita, N., Novalina, D., Andri Nur Sholihah, dan, Studi Bioteknologi, P., Sains dan Teknologi, F., & Yogyakarta, A. (2022). Isolasi Dan Identifikasi Fenotipik Bakteri Asam Laktat (BAL) Indigenous Asal Air Susu Ibu (ASI). *Jurnal Teknologi Pangan*, 5(1), 18–23. <https://ejournal3.undip.ac.id/index.php/tekpangan/article/view/22289>
- Suardana, I. W. (2014). Analysis of Nucleotide Sequences of the 16SrRNA Gene of Novel *Escherichia coli* Strains Isolated from Feces of Human and Bali Cattle. *Journal of Nucleic Acids*, 2014. <https://doi.org/10.1155/2014/475754>
- Vantsawa, P. A., Maryah, U. T., & Bulus, T. (2017). Isolation and Identification of Lactic Acid Bacteria with Probiotic Potential from Fermented Cow Milk

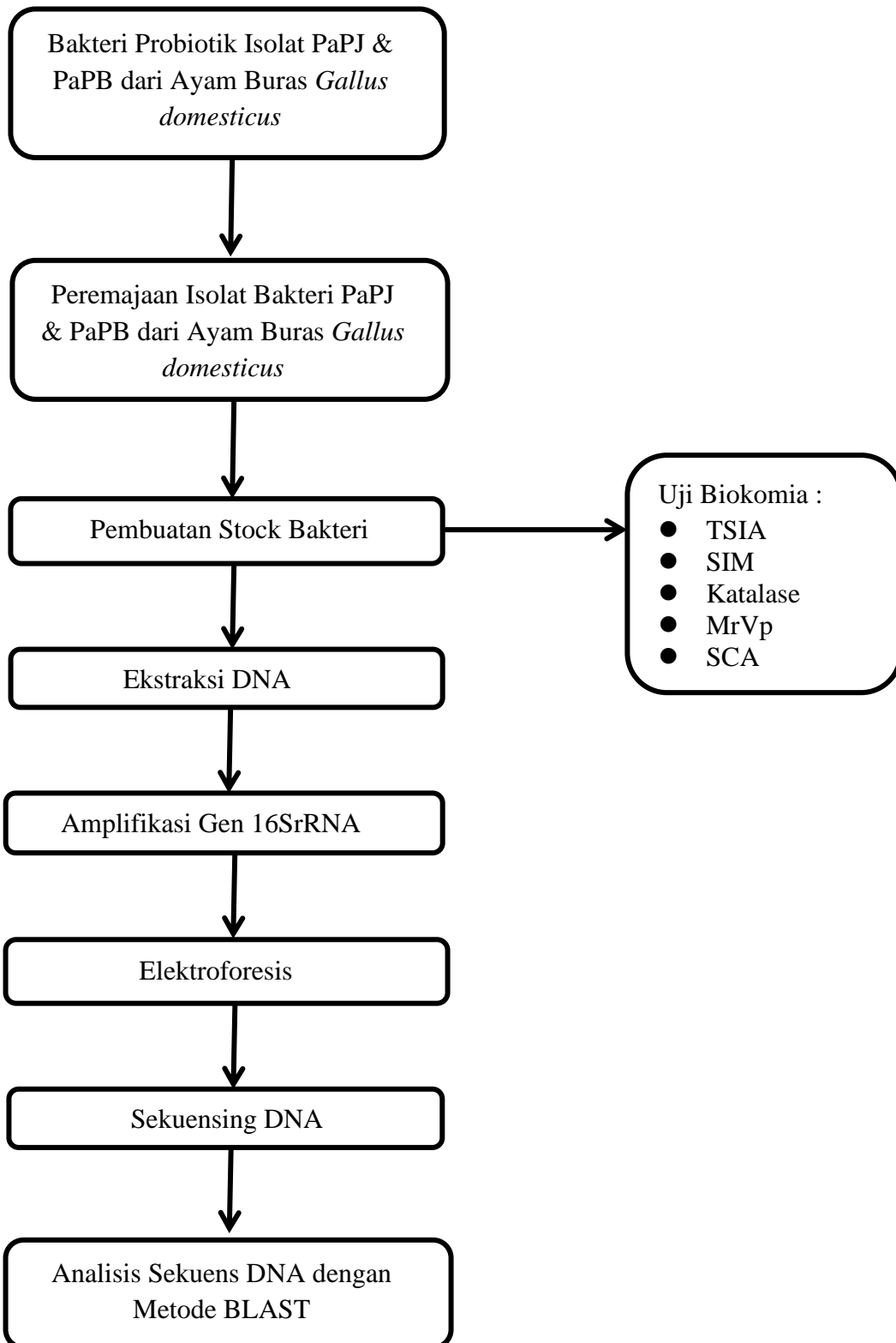
(Nono) in Unguwar Rimi Kaduna State Nigeria. *American Journal of Molecular Biology*, 07(02), 99–106. <https://doi.org/10.4236/ajmb.2017.72008>

Winand, R., Bogaerts, B., Hoffman, S., Lefevre, L., Delvoye, M., Van Braekel, J., Fu, Q., Roosens, N. H. C., De Keersmaecker, S. C. J., & Vanneste, K. (2020). Targeting the 16SrRNA Gene for Bacterial Identification in Complex Mixed Samples: Comparative Evaluation of Second (Illumina) and Third (Oxford Nanopore Technologies) Generation Sequencing Technologies. *International Journal of Molecular Sciences*, 21(1). <https://doi.org/10.3390/IJMS21010298>

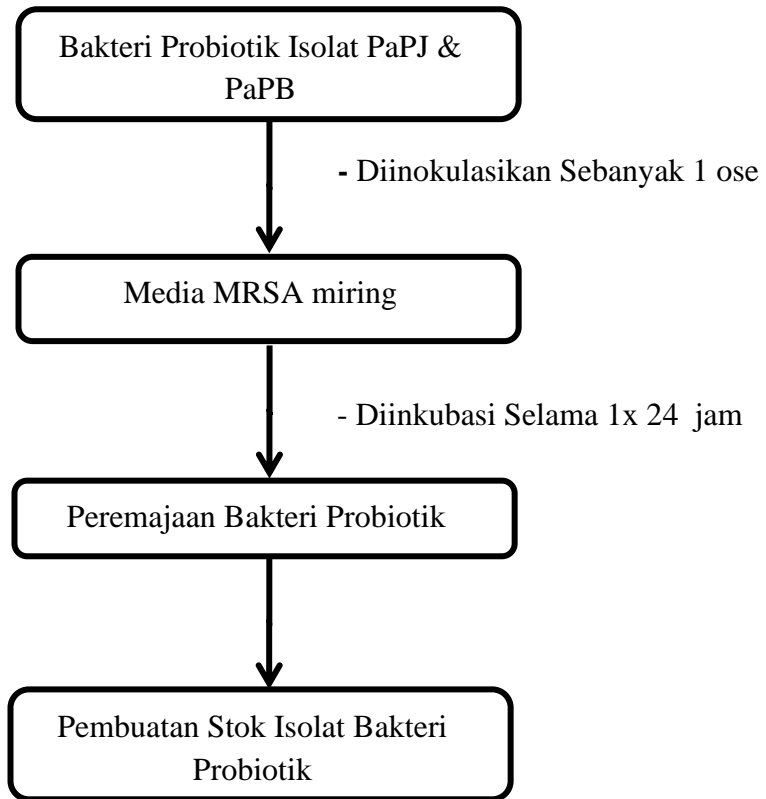
Yu, M., Cao, Y., & Ji, Y. (2017). The principle and application of new PCR Technologies. *IOP Conference Series: Earth and Environmental Science*, 100(1). <https://doi.org/10.1088/1755-1315/100/1/012065>

Yulianto, B., & Lokapirnasari, W. (2018). Isolation and Identification of Lactic Acid Bacteria From the Digestive Tract of Kampung Chicken. *Philipp. J. Vet. Med.*, 55, 67–72.

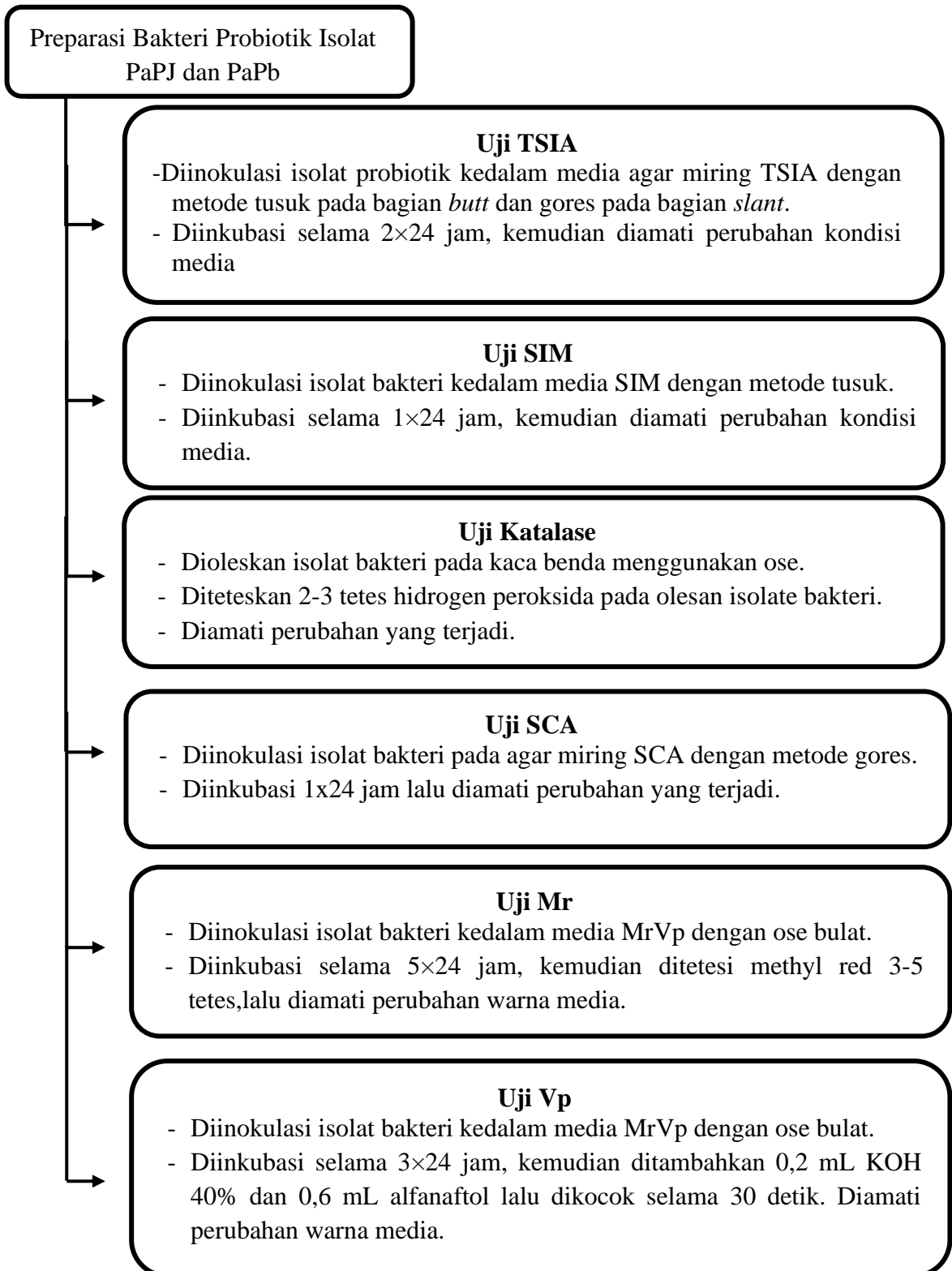
Lampiran 1. Skema Kerja Penelitian



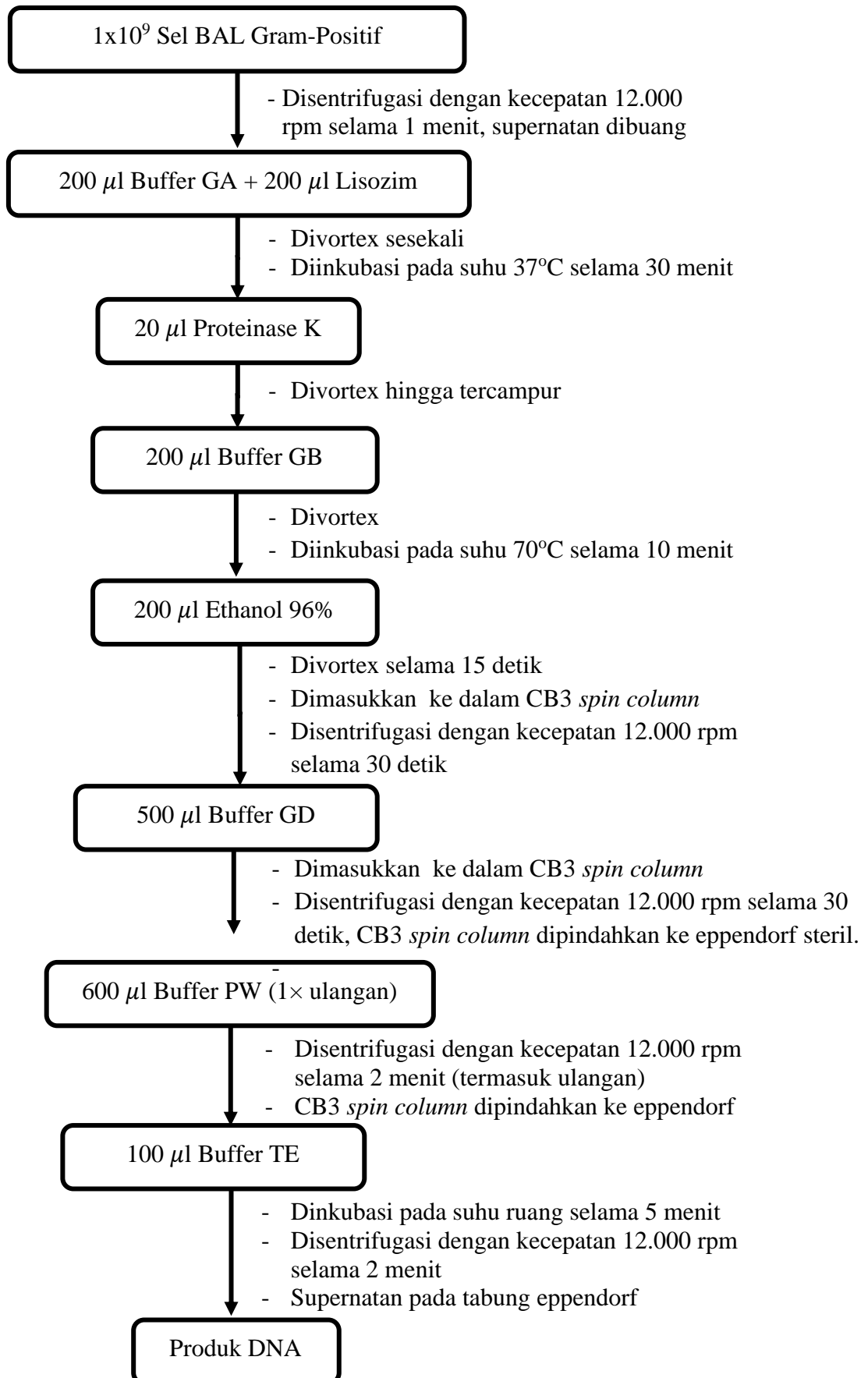
Lampiran 2. Skema Kerja Kultivasi Isolat Bakteri Probiotik



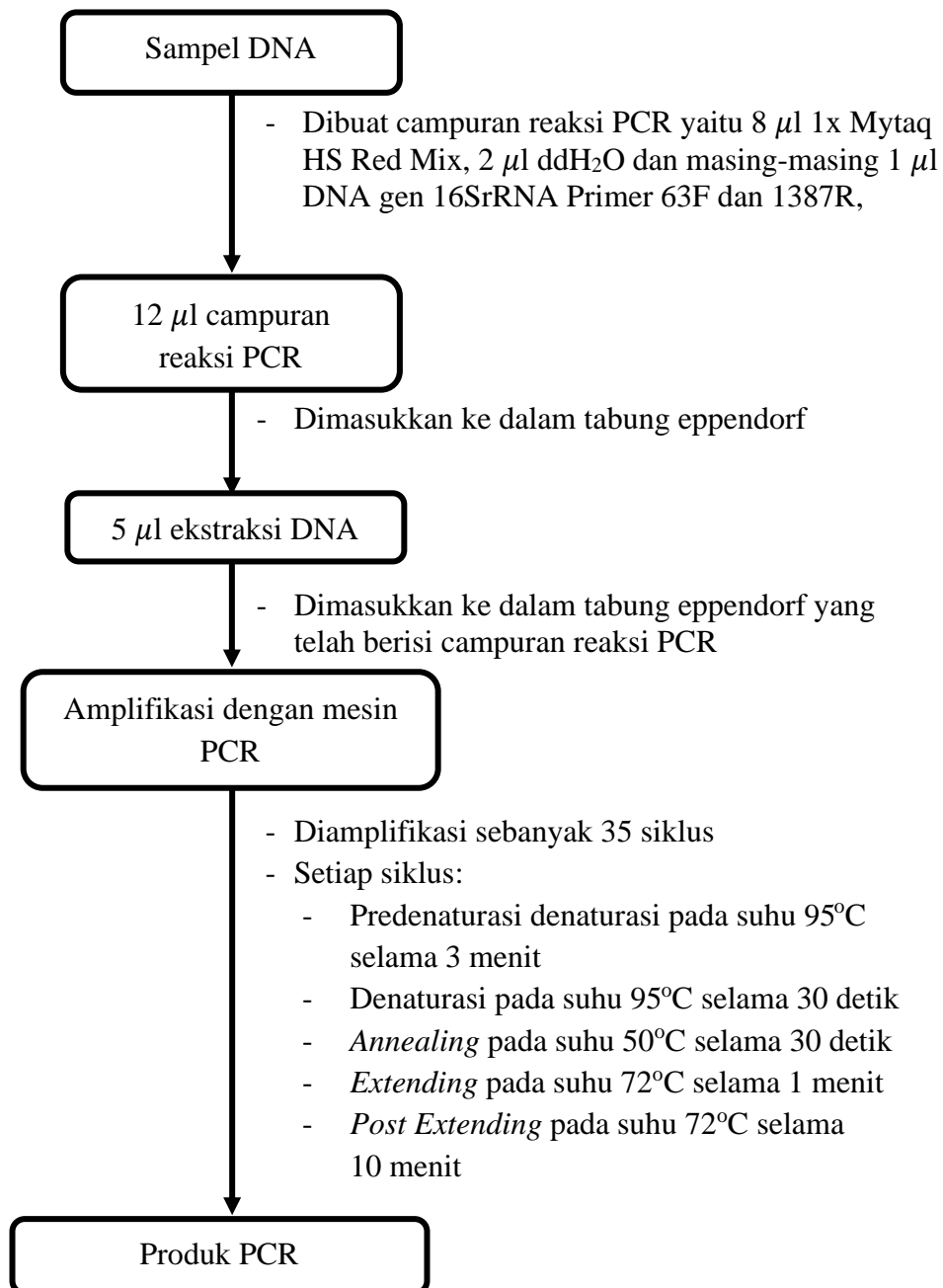
Lampiran 6. Skema Kerja Uji Biokimia Bakteri Probiotik



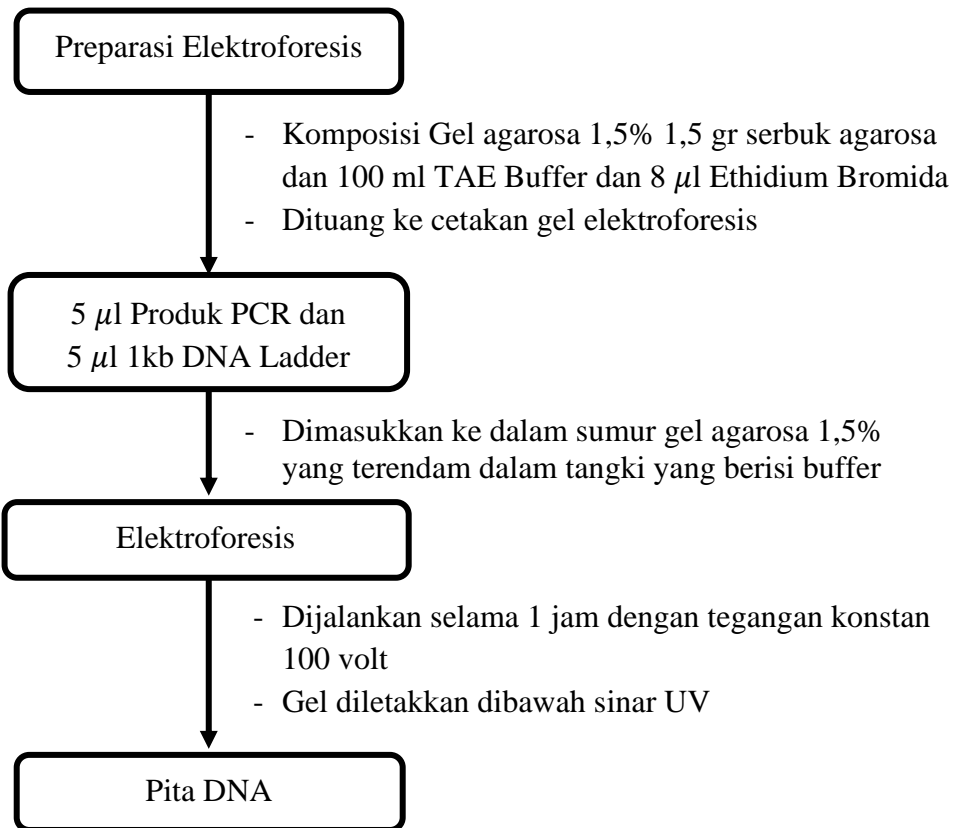
Lampiran 7. Skema Kerja Ekstraksi DNA Bakteri



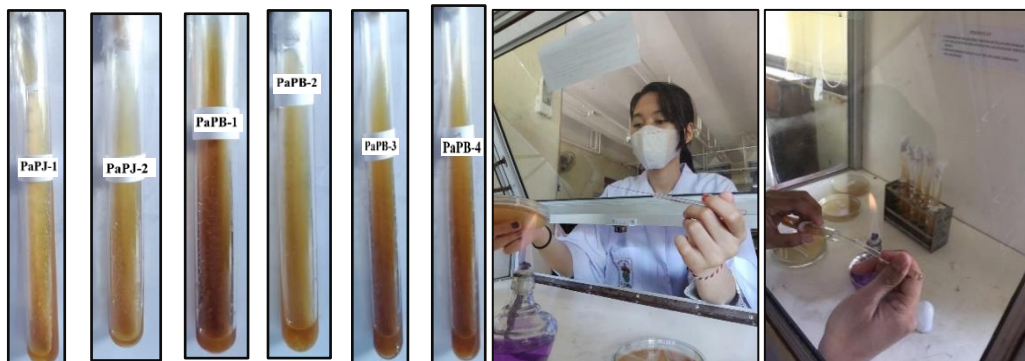
Lampiran 8. Skema Kerja Amplifikasi DNA dengan PCR



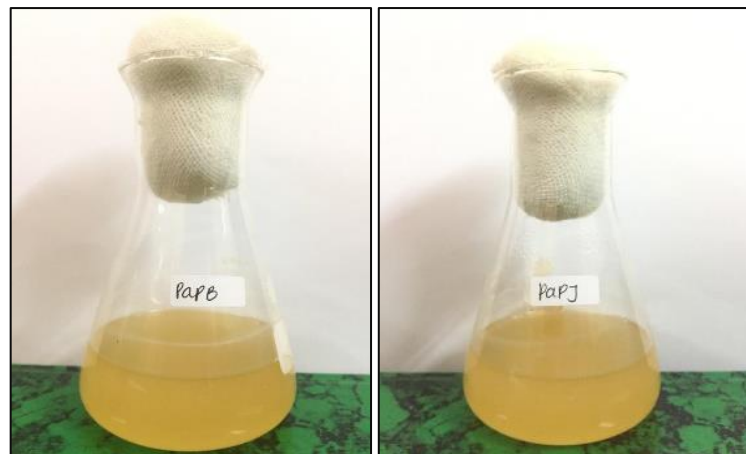
Lampiran 9. Skema Kerja Visualisasi Produk PCR dengan Elektroforesis



Lampiran 10. Dokumentasi Kultivasi Isolat Bakteri Probiotik



Stok Bakteri Probiotik Isolat PaPJ dan PaPB

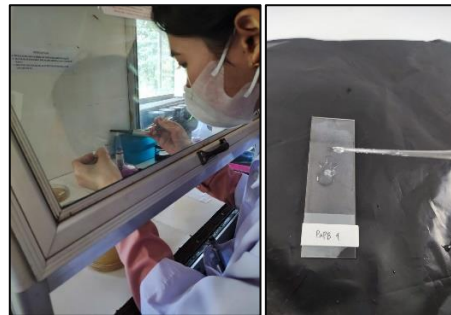


Hasil Peremajaan Bakteri Probiotik Isolat PaPJ dan PaPB

Lampiran 11. Dokumentasi Uji Biokimia Bakteri Probiotik Isolat PaPJ dan PaPB



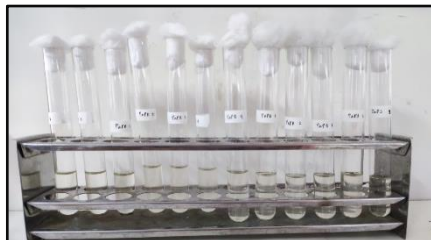
UJI TSIA



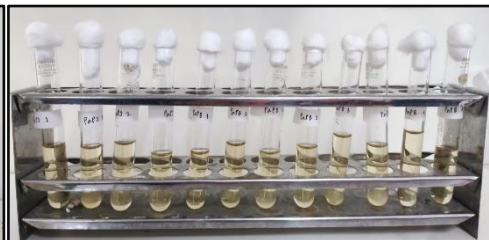
UJI KATALASE



UJI SCA

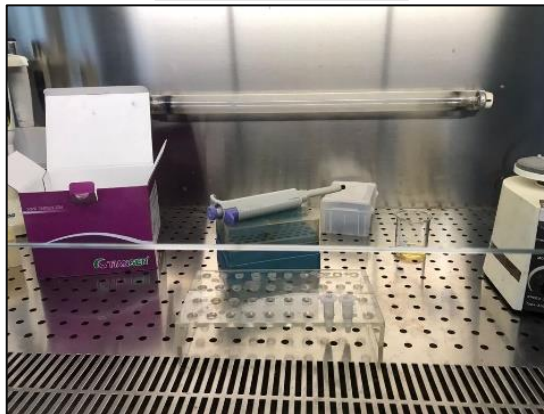


UJI MR-VP

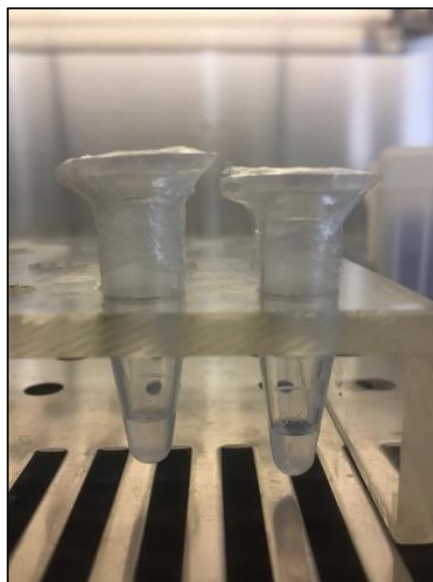


UJI SIM

Lampiran 12. Dokumentasi Ekstraksi DNA Bakteri Probiotik Isolat PaPJ dan PaPB

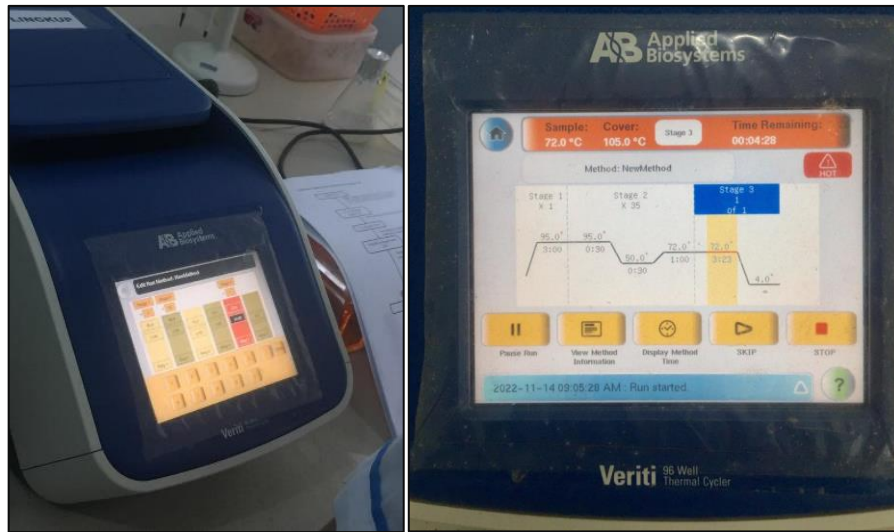


Proses Ekstraksi DNA

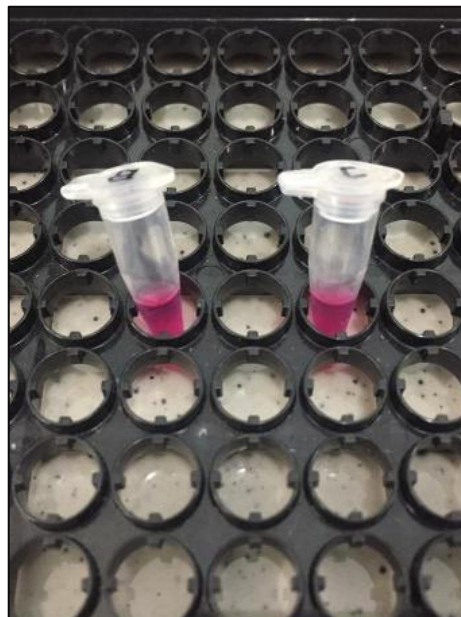


Hasil Ekstraksi DNA

Lampiran 13. Proses *Polymerase Chain Reaction* (PCR)

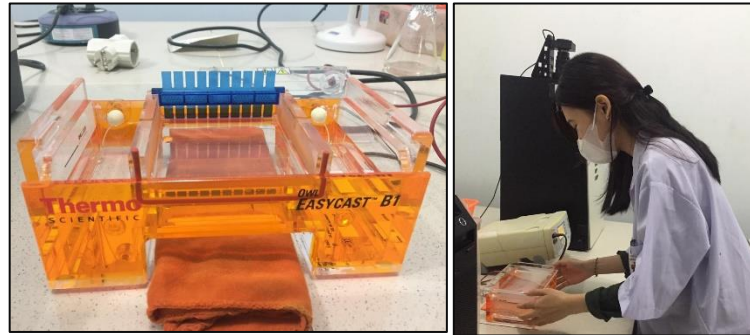


Pengoperasian Alat PCR

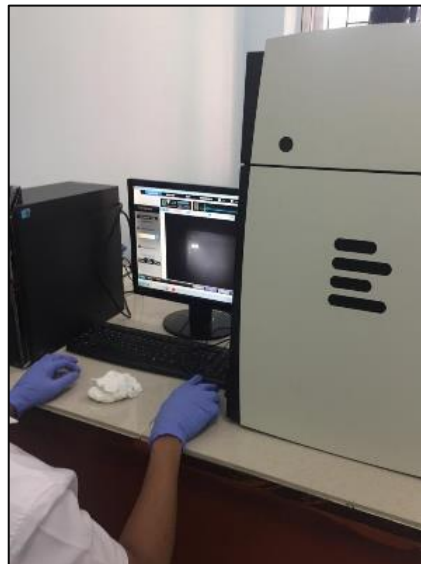


Hasil Produk PCR

Lampiran 14. Dokumentasi Visualisasi Produk PCR dengan Elektroforesis

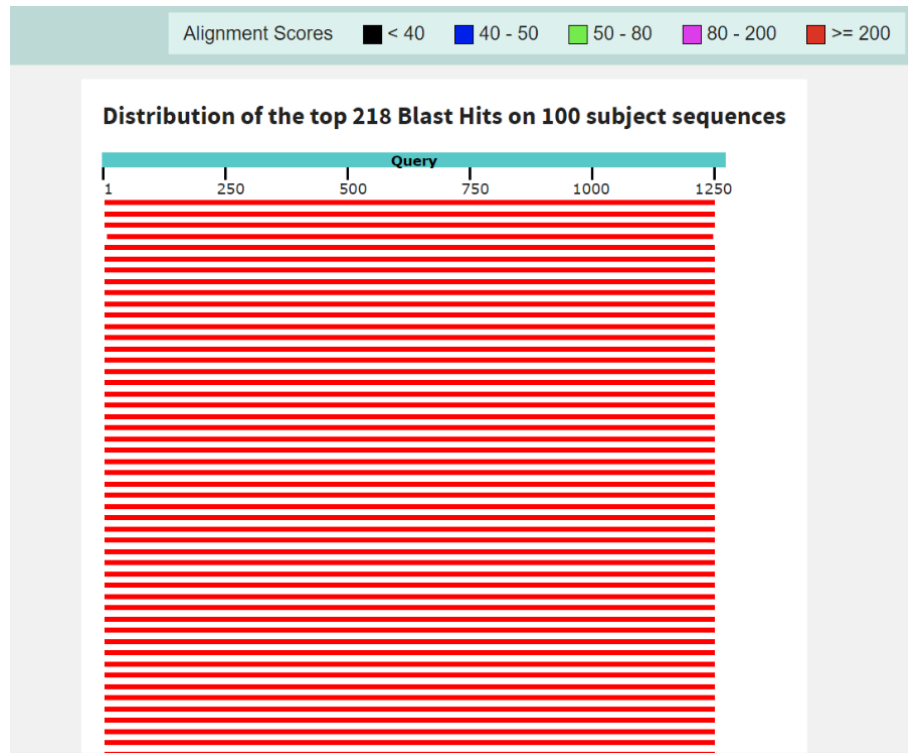


Pengoperasian Alat Elektroforesis



Visualisasi pita DNA

Lampiran 15. Hasil Analisis Sekuens DNA Isolat PaPJ dan PaPB



Graphic Summary PaPJ dan *Enterococcus faecalis* strain LC1M8

Enterococcus faecalis strain L1C1M8 16S ribosomal RNA gene, partial sequen

Sequence ID: [KX373583.1](#) Length: 1301 Number of Matches: 1

Range 1: 65 to 1299 [GenBank](#) [Graphics](#)

[▼ Next Match](#) [▲ Previ](#)

Score	Expect	Identities	Gaps	Strand
2182 bits(1181)	0.0	1216/1236(98%)	5/1236(0%)	Plus/Minus
Query 10	GGCGTGCTGATCCGCGATTACTAGCGATTCCGGCTTCATGCAGGCGAGTTGCAGCCTGCA	69		
Sbjct 1299	GGCGTGCTGATCCGCGATTACTAGCGATTCCGGCTTCATGCAGGCGAGTTGCAGCCTGCA	1240		
Query 70	ATCCGAAC TGAGAGAAGCTTTAAGAGATTTCATGACCTCGCGGCTTAGCGACTCGTTGT	129		
Sbjct 1239	ATCCGAAC TGAGAGAAGCTTTAAGAGATTTCATGACCTCGCGGCTTAGCGACTCGTTGT	1180		
Query 130	ACTTCCCATTGTAGCACGTGTGTAGCCAGGTCATAAGGGGCATGATGATTTGACGTCAT	189		
Sbjct 1179	ACTTCCCATTGTAGCACGTGTGTAGCCAGGTCATAAGGGGCATGATGATTTGACGTCAT	1120		
Query 190	CCCCACCTTCTCCGGTTTGTACCCGGCAGTCTCGCTAGAGTGCCCAACTAAATGATGGC	249		
Sbjct 1119	CCCCACCTTCTCCGGTTTGTACCCGGCAGTCTCGCTAGAGTGCCCAACTAAATGATGGC	1060		
Query 250	AAC TAACAATAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCT	309		
Sbjct 1059	AAC TAACAATAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCT	1000		
Query 310	GACGACAACCATGCACCACCTGTCACTTTGTCCCGAAGGGAAAAGCTCTATCTCTAGAGT	369		
Sbjct 999	GACGACAACCATGCACCACCTGTCACTTTGTCCCGAAGGGAAAAGCTCTATCTCTAGAGT	940		
Query 370	GGTCAAAGGATGTCAAGACCTGGTAAGGTTCTTCGCGTTGCTTCGAATTAACCCACATGC	429		
Sbjct 939	GGTCAAAGGATGTCAAGACCTGGTAAGGTTCTTCGCGTTGCTTCGAATTAACCCACATGC	880		

Hasil Analisis Pensejajaran (*Alignment*) sekuens DNA Isolat PaPJ dengan Database GeneBank *Enterococcus faecalis* strain LC1M8



Graphic Summary PaPB dan *Enterococcus faecalis* strain CE_18_3

Enterococcus faecalis strain CE_18_3 16S ribosomal RNA gene, partial sequen

Sequence ID: [MN629276.1](#) Length: 1423 Number of Matches: 1

Range 1: 67 to 1312 [GenBank](#) [Graphics](#)

▼ Next Match ▲ Previ

Score	Expect	Identities	Gaps	Strand
2189 bits(1185)	0.0	1228/1248(98%)	7/1248(0%)	Plus/Minus
Query 10	GGCGTGCTGATCCGCGATTACTAGCGATTCCGGCTTCATGCAGGCGAGTTGCAGCCTGCA	69		
Sbjct 1312	GGCGTGCTGATCCGCGATTACTAGCGATTCCGGCTTCATGCAGGCGAGTTGCAGCCTGCA	1253		
Query 70	ATCCGAAGTGAAGAGAAAGCTTTAAGAGATTTGCATGACCTCGCGGTCTAGCGACTCGTTGT	129		
Sbjct 1252	ATCCGAAGTGAAGAGAAAGCTTTAAGAGATTTGCATGACCTCGCGGTCTAGCGACTCGTTGT	1193		
Query 130	ACTTCCCATTGTAGCACGTGTGTAGCCAGGTCATAAGGGGCATGATGATTTGACGTCAT	189		
Sbjct 1192	ACTTCCCATTGTAGCACGTGTGTAGCCAGGTCATAAGGGGCATGATGATTTGACGTCAT	1133		
Query 190	CCCCACCTTCTCCGTTTGTACCCGGCAGTCTCGCTAGAGTGCCCAACTAAATGATGGC	249		
Sbjct 1132	CCCCACCTTCTCCGTTTGTACCCGGCAGTCTCGCTAGAGTGCCCAACTAAATGATGGC	1073		
Query 250	AACTAACAATAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCT	309		
Sbjct 1072	AACTAACAATAAGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCT	1013		
Query 310	GACGACAACCATGCACCACCTGTCACCTTTGTCCCGAAGGGAAAGCTCTATCTCTAGAGT	369		
Sbjct 1012	GACGACAACCATGCACCACCTGTCACCTTTGTCCCGAAGGGAAAGCTCTATCTCTAGAGT	953		
Query 370	GGTCAAAGGATGTCAAGACCTGGTAAGGTTCTTCGCGTTGCTTCGAATTAACCCATGC	429		
Sbjct 952	GGTCAAAGGATGTCAAGACCTGGTAAGGTTCTTCGCGTTGCTTCGAATTAACCCATGC	893		
Query 430	TCCACCGCTTGTGCGGGCCCGTCAATTCCTTTGAGTTTCAACCTTGCGGTCTACTCC	489		

Hasil Analisis Pensejajaran (*Alignment*) sekuens DNA Isolat R6 dengan Database GeneBank *Enterococcus faecalis* strain CE_18_3