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DAFTAR PUSTAKA

Abd-Ellatieff, H.A., Hegazy, A.A., AbouRawash, A.A., Tohamy, H.G., Al-Shehri, M., Bazh, E.K., Hassan, H., & Essa, B.H. 2023. Pathological and genetic characterization of foot and mouth disease viruses collected from cattle and water buffalo in Egypt. *PLOS ONE*. 18(10):e0291970. https://doi.org/10.1371/journal.pone.0291970.

Adjid, R.M.A. 2020. Foot and Mouth Disease: An Exotic Animal Disease that Must Be Alert of Entry into Indonesia. *Wartazoa*, 30(2):61-70. http://dx.doi.org/10.14334/wartazoa.v30i2.2490.

Ahmadi-Vasmehjani, A., Mousavi-Nasab, S., Baharlou, R., Jeirani, F., Shayestehpour, M., Yaghoubi S., Fazel, H., & Mahravani, H. 2013. Diagnosis of Foot-and-Mouth Disease Virus by Real Time Reverse Transcription Polymerase Chain Reaction Assay in Iran. *Iranian Journal of Virology*. 2013; 7(1-2):21-29. http://dx.doi.org/10.21859/isv.7.1.2.21.

Alexandersen, S., Zhang, Z., Donaldson, A.I., & Garland, A.J.M. 2003. Review: The Pathogenesis and Diagnosis of Foot-and-Mouth Disease. *Journal of Comparative Pathology*. 129(1):1-36. https://doi.org/10.1016/s0021-9975(03)00041-0.

Alfianto, D.N., & Lambelanova, R. 2021. Pemberdayaan Usaha Mikro Kecil Menengah Susu Sapi Perah di Kabupaten Boyolali Provinsi Jawa Tengah. *Jurnal Pembangunan Pemberdayaan Pemerintahan*. 6:2. https://doi.org/10.33701/j-3p.v6i2.1960.

Ali, A., Hafez, M., Ahmed, B., Hasanin, S., Al-Gabri, N., & Sheire, H. 2016. Pathological and Molecular Investigations on Foot and Mouth Virus Outbreaks Among Cattle Herds in Dakahlia Governorate, Egypt. *Zagazig Veterinary Journal*. 44(2):128-137. http://dx.doi.org/10.21608/zvjz.2016.7855.

Allen, A.J., & Rood, K.A. 2008. Vesicular Stomatitis in Cattle. *All Current Publications*. Paper 48. https://digitalcommons.usu.edu/extension_curall/48.

Anazawa, T., Yamazaki, M., Yamamoto, S., & Inaba, R. 2022. DNA sequencing using the RGB image sensor of a consumer digital color camera. *Sensors and Actuators B: Chemical*. 353:131047. https://doi.org/10.1016/j.snb.2021.131047.

Armson, B., Mioulet, V., Doel, C., Madi, M., Parida, S., Lemire, K.A., Holder, D.J., Das, A., McIntosh, M.T., & King, D.P. 2018. Detection of foot-and-

UNIVERSITAS
GADJAH MADA
**Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada
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mouth disease virus in milk samples by real-time reverse transcription polymerase chain reaction: Optimisation and evaluation of a high-throughput screening method with potential for disease surveillance. *Veterinary Microbiology*. 223:189-194. http://dx.doi.org/10.1016/j.vetmic.2018.07.024.

Arya, M., Shergill, I.S., Williamson, M., Gommersall, L., Arya, N., & Patel, H.R. 2005. Basic principles of real-time quantitative PCR. *Expert Review of Molecular Diagnostics*. 5(2):209-19. https://doi.org/10.1586/14737159.5.2.209.

Arzt, J., Juleff, N., Zhang, Z., & Rodriguez, L.L. 2011. The Pathogenesis of Foot-and-Mouth Disease I: Viral Pathways in Cattle. *Transboundary and Emerging Diseases*. 58(4):291-304. https://doi.org/10.1111/j.1865-1682.2011.01204.x.

Arzt, J., Pacheco, J.M., Stenfeldt, C., & Rodriguez, L.L. 2017. Pathogenesis of virulent and attenuated foot-and-mouth disease virus in cattle. *Virology Journal*. 14:89. https://doi.org/10.1186%2Fs12985-017-0758-9.

Ayelet, G., Mahapatra, M., Gelaye, E., Egziabher, B.G., Rufeal, T., Sahle, M., Ferris, N.P., Wadsworth, J., Hutchings, G.H., & Knowles, N.J. 2009. Genetic characterization of foot-and-mouth disease viruses, Ethiopia, 1981-2007. *Emerging Infectious Diseases*. 15(9):1409-1417. https://doi.org/10.3201%2Feid1509.090091.

Bachanek-Bankowska, K., Di Nardo, A., Wadsworth, J., Mioulet, V., Pezzoni, G., Grazioli, S., Brocchi, E., Kafle, S.C., Hettiarachchi, R., Kumarawadu, P.L., Eldaghayes, I.M., Dayhum, A.S., Meenowa, D., Sghaier, S., Madani, H., Abouchoaib, N., Hoang, B.H., Vu, P.P., Dukpa, K., Gurung, R.B., Tenzin, S., Wernery, U., Panthumart, A., Seeyo, K.B., Linchongsubongkoch, W., Relmy, A., Bakkali-Kassimi, L., Scherbakov, A., King, D.P., & Knowles, N.J. 2018. Reconstructing the evolutionary history of pandemic foot-and-mouth disease viruses: the impact of recombination within the emerging O/ME-SA/Ind-2001 lineage. *Scientific Report*. 8:14693. https://doi.org/10.1038/s41598-018-32693-8.

Balemual, A. 2018. Review on Pathogenesis, Economic Significance, Prevention and Controls of Foot and Mouth Disease. *Academic Journal of Animal Diseases*. 7(1):12-20. https://doi.org/10.5829/idosi.ajad.2018.12.20.

Bartlett, J.M., & Stirling, D. 2003. A short history of the polymerase chain reaction. *Methods in Molecular Biology*. 226:3-6. https://doi.org/10.1385/1-59259-384-4:3.

Beard, C.W., & Mason, P.W. 2000. Genetic Determinants of Altered Virulence of Taiwanese Foot-and-Mouth Disease Virus. *Journal of Virology*.

UNIVERSITAS
GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada
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74(2):987-991. https://doi.org/10.1128%2Fjvi.74.2.987-991.2000.

Beaudeau, F., Belloc, C., Seegers, H., Assié, S., Sellal, E., & Joly, A. 2001. Evaluation of a blocking ELISA for the detection of bovine viral diarrhoea virus (BVDV) antibodies in serum and milk. *Veterinary Microbiology*. 80:329-337. https://doi.org/10.1016/s0378-1135(01)00322-4.

Belsham, G.J. 2005. Translation and Replication of FMDV RNA. *Current Topics in Microbiology and Immunology*. 288:43-70. https://doi.org/10.1007/3-540-27109-0_3.

Belsham, G.J., & Botner, A. 2015. Use of recombinant capsid proteins in the development of a vaccine against the foot-and-mouth disease virus. *Virus Adaptation and Treatment*. 7:11-23. https://doi.org/10.2147/VAAT.S55351.

Bertram, M.R., Bravo de Rueda,C., Garabed, R., Jumbo, S.D., Moritz, M., Pauszek, S., Abdoulkadiri, S., Rodriguez, L.L., & Arzt, J. 2018. Molecular epidemiology of foot-and-mouth disease virus in the context of transboundary animal movement in the far North Region of Cameroon. *Frontiers in Veterinary Science*. 5:320. https://doi.org/10.3389/fvets.2018.00320.

Bezerra, C.S., Cargnelutti, J.F., Sauthier, J.T., Weiblen, R., Flores, E.F., Alves, C.J., Clementino, I.J., Santos, C.S.A.B., & Azevedo, S.S. 2018. Epidemiological situation of vesicular stomatitis virus infection in cattle in the state of Paraíba, semiarid region of Brazil. *Preventive Veterinary Medicine*. 160:68-75. https://doi.org/10.1016/j.prevetmed.2018.09.027.

Bisht, S. 2013. DNA Sequencing: Methods and Applications. *In book: Advances in Biotechnology*. pp.11-21. https://www.researchgate.net/publication/258283948.

Blacksell, S.D., Dhawan, S., Kusumoto, M., Le, K.K., Summermatter, K., O'Keefe, J., Kozlovac, J., Almuhairi, S.S., Sendow, I., Scheel, C.M., Ahumibe, A., Masuku, Z.M., Bennett, A.M., Kojima, K., Harper, D.R., & Hamilton, K. 2023. The Biosafety Research Road Map: The Search for Evidence to Support Practices in Human and Veterinary Laboratories. *Applied Biosafety*. 28(2):64-71. https://doi.org/10.1089%2Fapb.2022.0040.

Blacksell, S.D., Siengsanan-Lamont, J., Kamolsiripichaiporn, S., Gleeson, L.J., & Windsor, P.A. 2019. A history of FMD research and control programmes in Southeast Asia: lessons from the past informing the future. *Epidemiology and Infection*. 147(e171):1-13. https://doi.org/10.1017/S0950268819000578.

UNIVERSITAS GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada Sapi Madura dan Sapi Peranakan Ongole di Boyolali, Jawa Tengah
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Boisvert, R.N., Kay, D., & Turvey C.G. 2012. Macroeconomic Costs to Large Scale Disruptions of FoodProduction: The Case of Foot-and-Mouth Disease in the United States. *Economic Modelling*. 29(5):1921-30. https://doi.org/10.1016/j.econmod.2012.06.007.

Brito, B.P., Rodriguez, L.L., Hammond, J.M., Pinto, J., & Perez, A.M. 2015. Review of the global distribution of foot-and-mouth disease virus from 2007 to 2014. *Transboundary and Emerging Diseases*. 64:316–332. https://doi.org/10.1111/tbed.12373.

Brooksby, J.B. 1958. The virus of foot-and-mouth disease. *Advances in Virus Research*. 5:1-37.

Brooksby, J.B., & Rogers, J. 1957. Methods used in typing the virus of foot-and-mouth disease at Pirbright, 1950-1955. In: Methods of typing and cultivation of foot-and-mouth disease virus. 208:31-34.

Brown, C.C., Piccone, M.E., Mason, P.W., McKenna, T.S., & Grubman, M.J. 1996. Pathogenesis of wild-type and leaderless foot-and-mouth disease virus in cattle. *Journal of Virology*. 70(8):5638-5641. https://doi.org/10.1128%2Fjvi.70.8.5638-5641.1996.

Buttner, M., & Rziha, H.J. 2002. Parapoxviruses: from the lesion to the viral genome. *Journal of Veterinary Medicine*. *B, Infectious Diseases and Veterinary Public Health*. 49(1):7-16. https://doi.org/10.1046/j.1439-0450.2002.00539.x.

Callahan, J.D., Brown, F., Osorio, F.A., Sur, J.H., Kramer, E., Long, G.W., Lubroth, J., Ellis, S.J., Shoulars, K.S., Gaffney, K.L., Rock, D.L., & Nelson, W.M. 2002. Use of a portable real-time reverse transcriptase-Polymerase Chain Reaction assay for rapid detection of foot-and-mouth disease virus. *Journal of the American Veterinary Medical Association*. 220(11):1636-42. https://doi.org/10.2460/javma.2002.220.1636.

Cao, Y., Yu, M., Dong, G., Chen, B., & Zhang, B. 2020. Digital PCR as an Emerging Tool for Monitoring of Microbial Biodegradation. *Molecules*. 25(3):706. https://doi.org/10.3390/molecules25030706.

Carrillo, C., Tulman, E. R., Delhon, G., Lu, Z., Carreno, A., Vagnozzi, A., Kutish, G. F., & Rock, D. L. 2005. Comparative genomics of foot-and-mouth disease virus. *Journal of Virology*. 79(10):6487-6504. https://doi.org/10.1128/JVI.79.10.6487-6504.2005.

Chinsangaram, J., Koster, M., & Grubman, M.J. 2001. Inhibition of L-Deleted Foot-and-Mouth Disease Virus Replication by Alpha/Beta Interferon Involves Double-Stranded RNA-Dependent Protein Kinase. *Journal of Virology*. 75(12):5498-5503. https://doi.org/10.1128%2FJVI.75.12.5498-

UNIVERSITAS GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada Sapi Madura dan Sapi Peranakan Ongole di Boyolali, Jawa Tengah
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5503.2001.

de Oliveira, A.M., Laguardia-Nascimento, M., & Sales, M.L. 2021. Outbreaks of Vesicular Stomatitis in Brazil caused by a distinct lineage of Alagoas vesiculovirus. *Brazilian Journal of Microbiology*. 52:1637-1642. https://doi.org/10.1007/s42770-021-00537-9.

Dharmayanti, I. 2011. Filogenetika molekular: Metode taksonomi organisme berdasarkan sejarah evolusi. *Wartazoa*. 21(1):1-10.

Direktorat Jenderal Peternakan dan Kesehatan Hewan (DJPKH). 2023. Crisis Center PMK: Informasi Penanggulangan dan Tindakan Pencegahan Wabah PMK. *Direktorat Jenderal Peternakan dan Kesehatan Hewan, Kementrian Pertanian Republik Indonesia*. https://siagapmk.crisis-center.id/index.php. (diakses tanggal 25 Oktober 2023).

Donaldson, A. I., Ferris, N. P., & Wells, G. A. 1984. Experimental foot-and-mouth disease in fattening pigs, sows and piglets in relation to outbreaks in the field. *Veterinary Record*. 115(20)509-512. https://doi.org/10.1136/vr.115.20.509.

Dong, H., Lu, Y., Zhang, Y., Mu, S., Wang, N., Du, P., Zhi, X., Wen, X., Wang, X., Sun, S., Zhang, Y., & Guo, H. 2021. A Heat-Induced Mutation on VP1 of Foot-and-Mouth Disease Virus Serotype O Enhanced Capsid Stability and Immunogenicity. *Journal of Virology*. 95(16):e0017721. https://doi.org/10.1128/jvi.00177-21.

Ehtisham, M., Wani, F., Wani, I., Kaur, P., & Nissar, S. 2016. Polymerase Chain Reaction (PCR): Back to Basics. *Indian Journal of Contemporary Dentistry*. 4(2):30-35. http://dx.doi.org/10.5958/2320-5962.2016.00030.9.

El-Bagoury, G.F., Elhabashy, R., Mahmoud, A.H., Hagag, N.M., & El-Zowalaty, M.E. 2022. Development and evaluation of one-step real-time RT-PCR assay for improved detection of foot-and-mouth disease virus serotypes circulating in Egypt. *Journal of Virological Methods*. 306:114525. https://doi.org/10.1016/j.jviromet.2022.114525.

Eren, K., Taktakoğlu, N., & Pirim, I. 2023. DNA Sequencing Methods: From Past to Present. *The Eurasian Journal of Medicine*. 54:S47-S56. https://doi.org/10.5152/eurasianjmed.2022.22280.

Feng, Q., Chen, X., Ma, O., Liu, Y., Ding, M., Collins, R.A., Ko, L.S., Xing, J., Lau, L.T., Yu, A.C.H., & Chen, J. 2002. Serotype and VP1 gene sequence of a foot-and-mouth disease virus from Hong Kong. *Biochemical and Biophysical Research Communications*. 302(4):715-21. https://doi.org/10.1016/s0006-291x(03)00250-x.

UNIVERSITAS GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada Sapi Madura dan Sapi Peranakan Ongole di Boyolali, Jawa Tengah
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Fernandez-Sainz, I., Gavitt, T.D., Koster, M., Ramirez-Medina, E., Rodriguez, Y.Y., Wu, P., Silbart, L.K., delos-Santos, T., & Szczepanek, S.M. 2019. The VP1 G-H loop hypervariable epitope contributes to protective immunity against foot and mouth disease virus in swine. *Vaccine*. 37(26):3435-3442. https://doi.org/10.1016/j.vaccine.2019.05.019.

Fleming, S.B., Wise, L.M., & Mercer, A.A. 2015. Molecular genetic analysis of orf virus: a poxvirus that has adapted to skin. *Viruses*. 7(3):1505-1539. https://doi.org/10.3390/v7031505.

Food and Agriculture Organization of the United Nations (FAO) dan Office International des Epizooties (OIE). 2012. The Global Foot and Mouth Disease Control Strategy. *Strengthening Animal Health Systems Through Improved Control of Major Diseases*. OIE ISBN 978-92-9044-892-1; FAO ISBN 978-92-5-107273-8.

Franca, L.T., Carrilho, E., & Kist, T.B. 2002. A review of DNA sequencing techniques. *Quarterly Reviews of Biophysics*. 35(2):169-200. https://doi.org/10.1017/s0033583502003797.

Freeman, W.M., Walker, S.J., & Vrana, K.E. 1999. Quantitative RT-PCR: Pitfalls and potential. *BioTechniques*. 26(1):112-122, 124-125. https://doi.org/10.2144/99261rv01.

Gao, Y., Sun, S.Q., & Guo, H.C. 2016. Biological function of Foot-and-mouth disease virus non-structural proteins and non-coding elements. *Virology Journal*. 13:107. https://doi.org/10.1186%2Fs12985-016-0561-z.

Gibbs, R.A. 1990. DNA Amplification by the Polymerase Chain Reaction. *Analytical Chemistry*. 62(13):1202-1214. https://doi.org/10.1021/ac00212a004.

Grooms, D.L., Baker, J.C., & Ames, T.R. 2002. Diseases caused by bovine viral diarrhea virus. In: Large animal internal medicine, ed. Smith BP, 3rd ed. Mosby, St. Louis, MO. pp.707-714.

Grubman, M.J., & Barry, B. 2004. Foot-and-mouth disease. *Clinical Microbiology Reviews*. 17:465-493. https://doi.org/10.1128/cmr.17(2):465-493.2004.

Hall, B.G. 2001. Phylogenetic trees made easy: A how-to manual for molecular biologists. Sinauer Associates. Inc. Sunderland.

Handoyo, D., & Rudiretna, A. 2000. Prinsip Umum Dan Pelaksanaan Polymerase Chain Reaction (PCR) [General Principles and Implementation of Polymerase Chain Reaction]. *Unitas*. 9(1):17-29. ISSN 0854-3097.

UNIVERSITAS GADJAH MADA
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Haydon, D.T., Samuel, A.R., & Knowles, N.J. 2001. The generation and persistence of genetic variation in foot-and-mouth disease virus. *Preventive Veterinary Medicine*. 51(1-2):111-124. https://doi.org/10.1016/s0167-5877(01)00210-0.

Hemadri, D., Tosh, C., Sanyal, A., & Venkataramanan, R. 2002. Emergence of a new strain of type O foot-and-mouth disease virus: its phylogenetic and evolutionary relationship with the PanAsia pandemic strain. *Virus Genes*. 25(1):23-34. https://doi.org/10.1023/a:1020165923805.

Holliman, A. 2005. Differential diagnosis of diseases causing oral lesions in cattle. *In Practice*. 27(1):2-13. http://dx.doi.org/10.1136/inpract.27.1.2.

Hongbao, M. 2005. Development of Polymerase Chain Reaction (PCR). *The Journal of American Science*. 1(3). https://www.jofamericanscience.org/journals/am-sci/0103/01-0198-%20mahongbao-am.pdf. (diakses tanggal 10 November 2023).

House, C., & Meyer, R.F. 1993. The detection of foot-and-mouth disease virus in oesophageal-pharyngeal samples by a polymerase chain reaction technique. *Journal of Virological Methods*. 43(1):1-6. https://doi.org/10.1016/0166-0934(93)90084-5.

Jamal, S.M., & Belsham, G.J. 2013. Foot-and-mouth disease: past, present and future. *Veterinary Research*. 44(1):116. https://doi.org/10.1186/1297-9716-44-116.

Jamal, S.M., Ferrari, G., Ahmed, S., Normann, P., & Belsham, G.J. 2011. Molecular characterization of serotype Asia-1 foot-and-mouth disease viruses in Pakistan and Afghanistan; emergence of a new genetic Group and evidence for a novel recombinant virus. *Journal of Molecular Epidemiology and Evolutionary Genetics in Infectious Diseases*. 11(8):2049-2062. https://doi.org/10.1016/j.meegid.2011.09.015.

Jinding, C., Mingqiu, Z., Hui, K.H., & Leung, F.C. 2006. Molecular characterization of foot-and-mouth disease virus in Hong Kong during 2001-2002. *Virus Genes*. 32:139-43. https://doi.org/10.1007/s11262-005-6869-1.

Joshi, M., & Deshpande, J. 2011. Polymerase Chain Reaction: Methods, Principles and Application. *International Journal of Biomedical Research*. 1(5):81-97. https://doi.org/10.7439/IJBR.V2I1.83.

Kadri, K. 2019. Polymerase Chain Reaction (PCR): Principle and Applications. In: Perspectives on Polymerase Chain Reaction. http://dx.doi.org/10.5772/intechopen.86491.

UNIVERSITAS GADJAH MADA
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Kamal, S.A., & Hassan, R.A.E. 2017. Advanced virological and clinicopathological studies on cattle suffering from Foot and Mouth Disease virus. *Journal of Immunization*. 1(1):33-47. http://dx.doi.org/10.14302/issn.2577-137X.ji-17-1736.

Khounsy, S., Conlan, J.V., Gleeson, L.J., Westbury, H.A., Colling, A., Paton, D.J., Ferris, N.P., Valarcher, J.F., Wadsworth, J., Knowles, N.J., & Blacksell, S.D. 2009. Molecular epidemiology of foot-and-mouth disease viruses from South East Asia 1998-2006: the Lao perspective. *Veterinary Microbiology*. 137:178-183. https://doi.org/10.1016/j.vetmic.2008.12.008.

King, D. 2021. Global foot-and-mouth disease situation: risk and new development. The 24th SEACFMD National Coordinators Meeting-OIE-Asia. https://rr-asia.woah.org/wp-content/uploads/2021/07/01_donald_king_seacfmd-july-2021.pdf. (diakses tanggal 10 November 2023).

King, D.P., Ferris, N.P., Shaw, A.E., Reid, S.M., Hutchings, G.H., Giuffre, A.C., Robida, J.M., Callahan, J.D., Nelson, W.M., & Beckham, T.R. 2006. Detection of foot-andmouth disease virus: comparative diagnostic sensitivity of two independent real-time reverse transcription-polymerase chain reaction assays. *Journal of Veterinary Diagnostic Investigation*. 18:93-97. http://dx.doi.org/10.1177/104063870601800114.

Kitching, R.P. 2002. Clinical variation in foot and mouth disease: cattle. *Scientific & Technical Review*. 21(3):499-504. https://doi.org/10.20506/rst.21.3.1343.

Kitching, R.P., & Donaldson, A.I. 1987. Collection and transportation of specimens for vesicular virus investigation. *Revue Scientifique et Technique de L'Office International Des Epizooties*. 6(1):263-272.

Knight-Jones, T.J.D., & Rushton, J. 2013. The economic impacts of foot and mouth disease – What are they, how big are they and where do they occur?. *Preventive Veterinary Medicine*. 112(3-4):161-173. https://doi.org/10.1016%2Fj.prevetmed.2013.07.013.

Knowles, N.J., & Samuel, A.R. 1993. The definition and distribution of foot-and-mouth disease virus genotypes. Paper presented at 124th Meeting of the Society for General Microbiology, Virus Group Workshop on Molecular Epidemiology. University of Kent, Canterbury, 6th January 1993.

Knowles, N.J., & Samuel, A.R. 2003. Molecular epidemiology of foot-and-mouth disease virus. *Virus Research*. 91(1):65-80. https://doi.org/10.1016/s0168-1702(02)00260-5.

UNIVERSITAS GADJAH MADA
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Knowles, N.J., Davies, P.R., Henry, T., O'Donnell, V., Pacheco, J.M., & Mason, P.W. 2001. Emergence in Asia of foot-and-mouth disease viruses with altered host range: characterization of alterations in the 3A protein. *Journal of Virology*. 75(3):1551-1556. https://doi.org/10.1128/JVI.75.3.1551-1556.2001.

Knowles, N.J., Samuel, A.R., Davies, P.R., Midgley, R.J., & Valarcher, J.F. 2005. Pandemic strain of foot-and-mouth disease virus serotype O. *Emerging Infectious Diseases*. 11(12):1887-1893. https://doi.org/10.3201/eid1112.050908.

Knowles, N.J., Wadsworth, J., Bachanek-Bankowska, K., & King, D.P. 2016. VP1 sequencing protocol for foot and mouth disease virus molecular epidemiology. *Scientific & Technical Review*. 35(3):741-755. https://doi.org/10.20506/rst.35.3.2565.

Kress, W.J., Prince, L.M., & Williams, K.J. 2002, The phylogeny and a new classification of the gingers (Zingiberaceae): evidence from molecular data. *American Journal of Botany*. 89:1682-1696. https://doi.org/10.3732/ajb.89.10.1682.

Kumar, R., Moudgil, P., Grakh, K., Jindal, N., Sharma, M., & Gupta, R. 2022. Epidemiology, clinical features, and molecular detection of orf virus in Haryana (India) and its adjoining areas. *Tropical Animal Health and Production*. 54(5):268. https://doi.org/10.1007/s11250-022-03269-6.

Kumar, S., Stecher, G., Li, M., Knyaz, C., & Tamura., K. 2018. MEGA X: Molecular Evolutionary Genetics Analysis across computing platforms. *Molecular Biology and Evolution*. 35(6):1547-1549. https://doi.org/10.1093/molbev/msy096.

Lamb, R.A., & Kolakofsky, D. 1996. Paramyxoviridae: the viruses and the replication. In: Fields BN, Knipe KM, Howley PM, editors. Fields virolory. 3rd ed. Philadelphia (Pennsylvania): *Lippincott-Raven Publishers*. pp.1177-1199.

Le, V.P., Lee, K.N., Nguyen, T., Kim, S.M., Cho, I.S., Khang, D.D., Hien, N.B., Quyen, D.V., & Park, J.H. 2012. A rapid molecular strategy for early detection and characterization of Vietnamese foot-and-mouth disease virus serotypes O, A, and Asia 1. *Journal of Virological Methods*. 180(1-2):1-6. https://doi.org/10.1016/j.jviromet.2011.11.028.

Lee, H.S., Park, S.Y., Kim, A.Y., Lee, S.O., Kim, J.S., Kim, H., Youn, H.J., & Ko, Y.J. 2020. Recombinant vesicular stomatitis virus glycoprotein carrying a foot-and-mouth disease virus epitope as a vaccine candidate. *The Journal of Veterinary Medical Science*. 82(8):1155-1159. https://doi.org/10.1292%2Fjvms.19-0559.

UNIVERSITAS GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada Sapi Madura dan Sapi Peranakan Ongole di Boyolali, Jawa Tengah
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Lee, S.H., Jong, M.H., Huang, T.S., Lin, Y.L., Wong, M.L., Liu, C.I., & Chang, T.J. 2009. Pathology and viral distributions of the porcinophilic foot-andmouth disease virus strain (O/Taiwan/97) in experimentally infected pigs. *Transboundary and Emerging Diseases*. 56(5):189-201. https://doi.org/10.1111/j.1865-1682.2009.01079.x.

Lim, D.R., Ryoo, S., Kang, H., Oh, S.H., Jang, S.H., Kang, B., Park, H.J., Hwang, H., Kim, J.M., Park, C.K., & Cha, S.H. 2022. Enhanced detection and serotyping of foot-and-mouth disease virus serotype O, A, and Asia1 using a novel multiplex real-time RT-PCR. *Transboundary and Emerging Diseases*. 69(5):e2578-e2589. https://doi.org/10.1111/tbed.14603.

Liu, X., Lv, J., Fang, Y., Zhou, P., Lu, Y., Pan, L., Zhang, Z., Ma, J., Zhang, Y., & Wang, Y. 2017. Expression and Immunogenicity of Two Recombinant Fusion Proteins Comprising Foot-and-Mouth Disease Virus Structural Protein VP1 and DC-SIGN-Binding Glycoproteins. *Biomed Research International*. 7658970:9. https://doi.org/10.1155/2017/7658970.

MacLachlan, N.J., & Dubovi, E.J. 2017. Fenner's Veterinary Virology, 5th Edition. Elsevier. Oxford (UK): The Boulevard, Langford Lane, Kidlington.

Martinez-Salas, E., Saiz, J.C., Davila, M., Belsham, G.J., & Domingo, E. 1993. A single nucleotide substitution in the internal ribosome entry site of foot-and-mouth disease virus leads to enhanced cap-independent translation in vivo. *Journal of Virology*. 67(7):3748-3755. https://doi.org/10.1128/jvi.67.7.3748-3755.1993.

Mason, P.W., Grubman, M.J., & Baxt, B. 2003. Molecular basis of pathogenesis of FMDV. *Virus Research*. 91(1):9-32. https://doi.org/10.1016/s0168-1702(02)00257-5.

Mason, P.W., Piccone, M.E., Mckenna, T.S., Chinsangaram, J., & Grubman., M.J. 1997. Evaluation of a live-attenuated foot-and-mouth disease virus as a vaccine candidate. *Virology*. 227(1):96-102. https://doi.org/10.1006/viro.1996.8309.

Mateu, M. G., Martínez, M.A., Capucci, L., Andreu, D., Giralt, E., Sobrino, F., Brocchi, E., & Domingo, E.A. 1990. A single amino acid substitution affects multiple overlapping epitopes in the major antigenic site of foot-and-mouth disease virus of serotype C. *Journal of General Virology*. 71(3):629-37. https://doi.org/10.1099/0022-1317-71-3-629.

McCullough, K.C., De-Simone, F., Brocchi, E., Capucci, L., Crowther, J.R., & Kihm, U. 1992. Protective immune response against foot-and-mouth disease. *Journal of Virology*. 66(4):1835-1840. https://doi.org/10.1128/jvi.66.4.1835-1840.1992.

UNIVERSITAS
GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Metzker, M.L., & Caskey, C.T. 2009. Polymerase Chain Reaction (PCR). *Indian Journal of Contemporary Dentistry*. 4(2). https://doi.org/10.5958/2320-5962.2016.00030.9.

Micheloud, J.F., Aguirre, L.S., Sandoval, G.V., Avellaneda-Caceres, A., Diodati, J., & Peralta, A. 2020. Detection and first molecular characterization of bovine papular stomatitis virus in dairy calves in Argentina. *Tropical Animal Health and Production*. 52:453-459. https://doi.org/10.1007/s11250-019-02006-w.

Muroga, N., Kobayashi, S., Nishida, T., Hayama, Y., Kawano, T., Yamamoto, T., & Tsutsui, T. 2013. Risk factors for the transmission of foot-and-mouth disease during the 2010 outbreak in Japan: a case-control study. *BMC Veterinary Research*. 9:150. https://doi.org/10.1186/1746-6148-9-150.

Nandi, S., Kumar, M., Manohar, M., & Chauhan, S. 2009. Bovine herpes virus infections in cattle. *Animal Health Research Reviews*. 10(1):85-98. https://doi.org/10.1017/s1466252309990028.

Nazir, I., Mahmood, H.Z., & Mustafa, S.E. 2020. Polymerase Chain Reaction: a creative review. *Journal of Applied Biotechnology and Bioengineering*. 7(4):157-159. https://doi.org/10.15406/jabb.2020.07.00228.

Nishi, T., Kanno, T., Shimada, N., Morioka, K., Yamakawa, M., & Fukai, K. 2019. Reverse transcription-PCR using a primer set targeting the 3D region detects foot-and-mouth disease virus with high sensitivity. *Transboundary and Emerging Diseases*. 66(4):1776-1783. https://doi.org/10.1111/tbed.13202.

O'Donnell, V., Pacheco, J.M., Larocco, M., Gladue, D.P., Pauszek, S.J., Smoliga, G., Krug, P.W., Baxt, B., Borca, M.V., & Rodriguez, L. 2014. Virus-host interactions in persistently FMDV-infected cells derived from bovine pharynx. *Virology*. 468-470C(23):185-196. http://dx.doi.org/10.1016/j.virol.2014.08.004.

Oem, J.K., Yeh, M.T., McKenna, T.S., Hayes, J.R., Rieder, E., Giuffre, A.C., Robida, J.M., Lee, K.N., Cho, I.S., Fang, X., Joo, Y.S., & Park, J.H. 2008. Pathogenic characteristics of the Korean 2002 isolate of foot-and-mouth disease virus serotype O in pigs and cattle. *Journal of Comparative Pathology*. 138(4):204-214. https://doi.org/10.1016/j.jcpa.2008.01.007.

Office International des Epizooties (OIE). 2018. Manual 7: Sample collection and transport. Office International des Epizooties, Paris, France. https://rr-asia.woah.org/wp-content/uploads/2020/02/seacfmd-manual-7.pdf. (diakses tanggal 27 September 2023).

UNIVERSITAS GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada Sapi Madura dan Sapi Peranakan Ongole di Boyolali, Jawa Tengah
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

Office International des Epizooties (OIE). 2022. Foot and mouth disease (infection with foot and mouth disease virus) Section C, Chapter 3.1.8. In: Manual of Diagnostic Tests and Vaccines for Terrestrial Animals. 8th Ed. OIE, Paris, France.

OIE/FAO Reference Laboratory Network for Foot-and-Mouth Disease. 2022. Foot-and-Mouth Disease Virus Serotypes, Topotypes and Lineages. https://www.foot-and-mouth.org/FMDV-nomenclature-working-group/nomenclature. (diakses tanggal 26 Februari 2023).

Pasare, C., & Medzhitov, R. 2004. Toll-like receptors: linking innate and adaptive immunity. *Microbes and Infection*. 6(15):1382-1387. https://doi.org/10.1016/j.micinf.2004.08.018.

Pega, J., Bucafusco, D., Giacomo, S.D., Schammas, J.M., Malacari, D., Capozzo, A.V., Arzt, J., Pérez-Beascoechea, C., Maradei, E., Rodríguez, L.L., Borca, M.V., & Pérez-Filgueira, M. 2013. Early adaptive immune responses in the respiratory tract of foot-and-mouth disease virus-infected cattle. *Journal of Virology*. 87(5):2489-2495. https://doi.org/10.1128/jvi.02879-12.

Peng, J., Yi, J., Yang, W., Ren, J., Wen, Y., Zheng, H., & Li, D. 2020. Advances in Foot-and-Mouth Disease Virus Proteins Regulating Host Innate Immunity. *Frontiers in Microbiology*. 11:2046. https://doi.org/10.3389/fmicb.2020.02046.

Rajak, K.K., Sreenivasa, B.P., Hosamani, M., Singh, R.P., Singh, S.K., Singh, R.K., & Bandyopadhyay, S.K. 2005. Experimental studies on immunosuppressive effects of peste des petits ruminants (PPR) virus in goats. *Comparative Immunology, Microbiology and Infectious Diseases*. 28(4):287-96. https://doi.org/10.1016/j.cimid.2005.08.002.

Reeve, R., Borley, D.W., Maree, F.F., Upadhyaya, S., Lukhwareni, A., Esterhuysen, J.J., Harvey, W.T., Blignaut, B., Fry, E.E., Parida, S., Paton, D.J., & Mahapatra, M. 2016. Tracking the antigenic evolution of foot-and-mouth disease virus. *PLOS ONE*. 11(7):e0159360. https://doi.org/10.1371%2Fjournal.pone.0159360.

Reid, S.M., Ferris, N.P., Hutchings, G.H., Zhang, Z., Belsham, G.J., & Alexandersen, S. 2001. Diagnosis of foot-and-mouth disease by real-time fluorogenic PCR assay. *The Veterinary Record*. 149(20):621-623. https://doi.org/10.1136/vr.149.20.621.

Reid, S.M., Ferris, N.P., Hutchings, G.H., Zhang, Z., Belsham, G.J., & Alexandersen, S. 2002. Detection of all seven serotypes of foot-and-mouth disease virus by real-time, fluorogenic reverse transcription polymerase chain reaction assay. *Journal of Virological Methods*. 105: 67-80.

UNIVERSITAS GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada Sapi Madura dan Sapi Peranakan Ongole di Boyolali, Jawa Tengah
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Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

http://dx.doi.org/10.1016/S0166-0934(02)00081-2.

Rieder, E., Bunch, T., Brown, F., & Mason, P.W. 1993. Genetically engineered foot-and-mouth disease viruses with poly(C) tracts of two nucleotides are virulent in mice. *Journal of Virology*. 67(9):5139-5145. https://doi.org/10.1128%2Fjvi.67.9.5139-5145.1993.

Rieder, E., Paul, A.V., Kim, D.W., van Boom, J.H., & Wimmer, E. 2000. Genetic and biochemical studies of poliovirus cis-acting replication element cre in relation to VPg uridylylation. *Journal of Virology*. 74(22):10371-10380. https://doi.org/10.1128%2Fjvi.74.22.10371-10380.2000.

Roeder, P., Mariner, J., & Kock, R. 2013. Rinderpest: the veterinary perspective on eradication. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 368(1623):20120139. https://doi.org/10.1098%2Frstb.2012.0139.

Russell, G.C., Stewart, J.P., & Haig, D.M. 2009. Malignant catarrhal fever: a review. *Veterinary Journal*. 179(3):324-35. https://doi.org/10.1016/j.tvjl.2007.11.007.

Rweyemamu, M., Roeder, P., Mackay, D., Sumption, K., Brownlie, J., Leforban, Y., Valarcher, J.F., Knowles, N.J, & Saraiva, V. 2008. Epidemiological patterns of foot-and-mouth disease worldwide. *Transboundary and Emerging Diseases*. 55(1):57-72. https://doi.org/10.1111/j.1865-1682.2007.01013.x.

Ryoo, S., Lee, H., Lim, D.R., Lee, J.W., Bunnary, S., Tum, S., Lee, D.S., Hwang, H., Jeong, S., Nah, J., Ku, B.K., Kim, J.M., & Cha, S.H. 2021. Identification of the O/ME-SA/Ind-2001e Sublineage of Foot-and-Mouth Disease Virus in Cambodia. *Frontiers in Veterinary Science*. 8:749966. https://doi.org/10.3389/fvets.2021.749966.

Sachse, K., & Frey, J. 2003. PCR detection of microbial pathogens. Introduction. *Methods in Molecular Biology*. 216:v-vi. http://dx.doi.org/10.3201/eid1908.130528.

Saminathan, M., Singh, K.P., Khorajiya, J.H., Dinesh, M., Vineetha, S., Maity, M., Rahman, A.F., Misri, J., Malik, Y.S., Gupta, V.K., Singh, R.K., & Dhama, K. 2020. An updated review on bluetongue virus: epidemiology, pathobiology, and advances in diagnosis and control with special reference to India. *The Veterinary Quarterly*. 40(1):258-321. https://doi.org/10.1080/01652176.2020.1831708.

Samuel, A.R., Knowles, N.J. 2001. Foot-and-mouth disease type O viruses exhibit genetically and geographically distinct evolutionary lineages (topotypes). *Journal of General Virology*. 82(3):609-621. https://doi.org/10.1099/0022-

UNIVERSITAS
GADJAH MADA
**Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada
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1317-82-3-609.

Serrano, P., Pulido, M.R., Sáiz, M., & Martínez-Salas, E. 2006. The 3' end of the foot-and-mouth disease virus genome establishes two distinct long-range RNA-RNA interactions with the 5' end region. *Journal of General Virology*. 87(10):3013-3022. http://dx.doi.org/10.1099/vir.0.82059-0.

Sheikh, M.B., Rashid, P.A., Raheem, Z., Marouf, A.S., & Amin, K.M. 2021. Molecular characterization and phylogenetic analysis of foot and mouth disease virus isolates in Sulaimani province, Iraq. *Veterinary Research Forum*. 12(2):247-251. https://doi.org/10.30466%2Fvrf.2019.101755.2424.

Singh, J., Birbian, N., Sinha, S., & Goswami, A. 2014. A critical review on PCR, its types and applications. *International Journal of Advanced Research in Biological Sciences*. 1(7):65-80. ISSN: 2348-8069.

Skern, T., Fita, I., & Guarne, A. 1998. A structural model of picornavirus leader proteinases based on papain and bleomycin hydrolase. *Journal of General Virology*. 79(2):301-307. https://doi.org/10.1099/0022-1317-79-2-301.

Soehadji, Madole, M., & Setyaningsih, H. 1994. The experience of Indonesia in the control and eradication of foot-and-mouth disease. In Copland JW, Gleeson LJ and Chamnanpood C (eds), Diagnosis and Epidemiology of Foot-and-Mouth Disease in Southeast Asia: Proceedings of an International Workshop Held at Lampang, Thailand, September 6-9, 1993. Canberra: *Australian Centre for International Agricultural Research proceedings*. 51:64-69.

Stenfeldt, C., Diaz-San Segundo, F., de Los Santos, T., Rodriguez, L.L., & Arzt, J. 2016. The Pathogenesis of Foot-and-Mouth Disease in Pigs. *Frontiers in Veterinary Science*. 3:41. https://doi.org/10.3389%2Ffvets.2016.00041.

Stenfeldt, C., Lohse, L., & Belsham, G.J. 2013. The comparative utility of oral swabs and probang samples for detection of foot-and-mouth disease virus infection in cattle and pigs. *Veterinary Microbiology*. 162(2-4):330-337. https://doi.org/10.1016/j.vetmic.2012.09.008.

Susila, E.B., Daulay, R.S.D., Hidayati, D.N., Prasetyowati, S.R.B., Wriningati, Andesfha, E., Irianingsih, S.H., Dibia, I.N., Faisal, Supriyadi, A., Yupiana, Y., Hidayat, M.M., Zainuddin, N., & Wibawa, H. 2023. Detection and identification of foot-and-mouth disease O/ME-SA/Ind-2001 virus lineage, Indonesia, 2022. *Journal of Applied Animal Research*. 51(1):487-494. http://dx.doi.org/10.1080/09712119.2023.2229414.

The State of Queensland, Department of Agriculture and Fisheries (QDAF). 2023. Differential diagnoses for FMD in Queensland.

UNIVERSITAS
GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada
Sapi Madura dan Sapi Peranakan Ongole di Boyolali, Jawa Tengah
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https://www.publications.qld.gov.au/dataset/c9f25be4-8c5f-4317-8901-b2f80f765381/resource/e5481f94-9c19-4358-ba14-0f8209ca06d3/download/differential-diagnosis-for-fmd-in-queensland.pdf. (diakses tanggal 8 November 2023).

Thomson, G.R., Vosloo, W., & Bastos, A.D. 2003. Foot and mouth disease in wildlife. *Virus Research*. 91(1):145-161. https://doi.org/10.1016/s0168-1702(02)00263-0.

Toka, F.N., Nfon, C., Dawson, H., & Golde, W.T. 2009. Natural killer cell dysfunction during acute infection with foot-and-mouth disease virus. *Clinical and Vaccine Immunology*.16:1738-1749. https://doi.org/10.1128%2FCVI.00280-09.

Tosh, C., Sanyal, A., Hemadri, D., & Venkataramanan, R. 2002. Phylogenetic analysis of serotype A foot-and-mouth disease virus isolated in India between 1977 and 2000. *Archives of Virology*. 147:493-513. http://dx.doi.org/10.1007/s007050200002.

Vallee, H., & Carre, H. 1922. Sur la pluralité du virus aphteux. *Comptes Rendus Hebdomadaires des Seances de l Academie des Sciences*. 174:1498-1500.

van Regenmortel, M.H.V., Fauquet, C.M., Bishop, D.H.L., Carstens, E.B., Estes, M.K., Lemon, S.M., Maniloff, J., Mayo, M.A., McGeoch, D.J., Pringle, C.R., & Wickner, R.B. 2000. Virus Taxonomy: Classification and Nomenclature of Viruses. Seventh Report of the International Committee on Taxonomy of Viruses. San Diego: *Academic Press*. pp.3-16.

Vandenbussche, F., Mathijs, E., Lefebvre, D., de Clercq, K., & Van Borm, S. 2016. A tale of tails: dissecting the enhancing effect of tailed primers in real-Time PCR. *PLOS ONE*. 11(10): e0164463. http://dx.doi.org/10.1371/journal.pone.0164463.

Verma, K., Dalal, J., & Sharma, S. 2014. Scientific Concepts of Polymerase Chain Reaction (PCR). *International Journal of Pharmaceutical Sciences and Research*. 5(8):3086-3095. http://dx.doi.org/10.13040/IJPSR.0975-8232.5(8).3086-95.

Wacker, M.J., & Godard, M.P. 2005. Analysis of one-step and two-step Real-Time RT-PCR using SuperScript III. *Journal of Biomolecular Techniques*. 16(3):266-271. PMID: 16461951; PMCID: PMC2291734.

Waldmann, O., & Trautwein, K. 1926. Experimentelle Untersuchungen über die Pluralität des Maul-und Klauenseuchevirus. *Berliner tierärztliche Wochenschrift*. 42:569-571.

UNIVERSITAS
GADJAH MADA
Identifikasi dan Karakterisasi Molekuler Virus Foot and Mouth Disease Berbasis Fragmen Gen VP1 pada
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Wang, J.L., Liu, M.Q., Han, J., Chen, W.Z., Cong, W., Cheng, G., Gao, Y.H., Lu, Y.G., Chen, J.L., Zuo, X.P., Yan, W.Y., & Zheng, Z.X. 2007. A peptide of foot-and-mouth disease virus serotype Asia1 generating a neutralizing antibody response, and an immunostimulatory peptide. *Veterinary Microbiology*. 125(3-4):224-31. https://doi.org/10.1016/j.vetmic.2007.05.033.

Wong, C.L., Yong, C.Y., Ong, H.K., Ho, K.L., & Tan, W.S. 2020. Advances in the Diagnosis of Foot-and-Mouth Disease. *Frontiers in Veterinary Science*. 7:477. https://doi.org/10.3389/fvets.2020.00477.

World Organisation for Animal Health (WOAH). 2022. Indonesia-Suspension of 'FMD-free country where vaccination is not practised' status. Indonesia – Suspension of 'FMD-free country where vaccination is not practised' status - WOAH Bulletin. https://bulletin.woah.org/?officiel=11-1-2-2022-2_idn-fmd-suspension. (diakses tanggal 30 Januari 2023).

World Reference Laboratory for Foot-and-Mouth Disease (WRLFMD). 2022. FMD Prototype Strains. http://www.wrlfmd.org/fmdv-genome/fmd-prototype-strains. (diakses tanggal 18 Februari 2023).

Yusuf, Z.K. 2010. *Polymerase Chain Reaction* (PCR). Jurnal Saintek, 5(6):1-5.

Yuwono, T. 2006. Teori dan Aplikasi Polymerase Chain Reaction. Yogyakarta: *CV. Andi Offset*. pp.1-2.

Zainuddin, N., Susila, E.B., Wibawa, H., Daulay, R.S.W., Wijayanti, P.E., Fitriani, D., Hidayati, D.N., Idris, S., Wadsworth, J., Polo, N., Hicks, H.M., Mioulet, V., Knowles, N.J., & King, D.P. 2022. Genome Sequence of a Foot-and-Mouth Disease Virus Detected in Indonesia in 2022. *Microbiology Resource Announcements*. 12(2):e01081-22. https://doi.org/10.1128%2Fmra.01081-22.

Zhang, Q., Liu, X., Fang, Y., Pan, L., Lv, J., Zhang, Z., Zhou, P., Ding, Y., Chen, H., Shao, J., Zhao, F., Lin, T., Chang, H., Zhang, J., Wang, Y., & Zhang, Y. 2015. Evolutionary Analysis of Structural Protein Gene VP1 of Foot-and-Mouth Disease Virus Serotype Asia 1. *The Scientific World Journal*. 734253:7. http://dx.doi.org/10.1155/2015/734253.