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DAFTAR PUSTAKA

Abed, M., Soubies, S., Courtillon, C., Briand, F. X., Allée, C., Amelot, M., De Boisseson, C., Lucas, P., Blanchard, Y., Belahouel, A., Kara, R., Essalhi, A., Temim, S., Khelef, D., & Eterradossi, N. (2018). Infectious bursal disease virus in Algeria: Detection of highly pathogenic reassortant viruses. *Infection, Genetics and Evolution*, *60*, 48–57. https://doi.org/10.1016/j.meegid.2018.01.029

Akira, S. (2011). Innate immunity and adjuvants. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *366*(1579), 2748–2755. https://doi.org/10.1098/rstb.2011.0106

Akter, S., Bueaza Bupasha, Z., Alam, M., & Sarker, S. (2018a). Infectious Bursal Disease: A case compilation study in commercial broiler farms at Mirsarai, Chittagong, Bangladesh. *International Journal of Advanced Research in Biological Sciences*, *5*(4), 178–185. https://doi.org/10.22192/ijarbs

Akter, S., Bueaza Bupasha, Z., Alam, M., & Sarker, S. (2018b). International Journal of Advanced Research in Biological Sciences. *Int. J. Adv. Res. Biol. Sci*, *5*(4), 178–185. https://doi.org/10.22192/ijarbs

Aliyu, H. B., Hair-Bejo, M., Omar, A. R., & Ideris, A. (2021). Genetic Diversity of Recent Infectious Bursal Disease Viruses Isolated From Vaccinated Poultry Flocks in Malaysia. *Frontiers in Veterinary Science*, *8*. https://doi.org/10.3389/fvets.2021.643976

Aricibasi, M., Jung, A., Heller, E. D., & Rautenschlein, S. (2010). Differences in genetic background influence the induction of innate and acquired immune responses in chickens depending on the virulence of the infecting infectious bursal disease virus (IBDV) strain. *Veterinary Immunology and Immunopathology*, *135*(1–2), 79–92. https://doi.org/10.1016/j.vetimm.2009.11.005

Ashraf, S., Tang, Y., & Saif, Y. M. (2007). Development of differential RT-PCR assays and molecular characterization of the complete VP1 gene of five strains of very virulent infectious bursal disease virus. *Avian Diseases*, *51*(4), 935–941. https://doi.org/10.1637/7933-020907-REGR1.1

Bíró, É., Kocsis, K., Nagy, N., Molnár, D., Kabell, S., Palya, V., & Oláh, I. (2011). Origin of the chicken splenic reticular cells influences the effect of the

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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infectious bursal disease virus on the extracellular matrix. *Avian Pathology*, *40*(2), 199–206. https://doi.org/10.1080/03079457.2011.554797

Boot, H. J., Hoekman, A. J. W., & Gielkens, A. L. J. (2005). The enhanced virulence of very virulent infectious bursal disease virus is partly determined by its B-segment. *Archives of Virology*, *150*(1), 137–144. https://doi.org/10.1007/s00705-004-0405-9

Bottcher, B., Kiselev, N. A., Stel'mashchuk, V. Y., Perevozchikova, N. A., Borisov, A. V, & Crowther, R. A. (1997). Three-Dimensional Structure of Infectious Bursal Disease Virus Determined by Electron Cryomicroscopy. *Journal of Virology*, *71*(1), 325–330.

Brandt, M., Yao, K., Liu, M., Heckert, R. A., & Vakharia, V. N. (2001). Molecular Determinants of Virulence, Cell Tropism, and Pathogenic Phenotype of Infectious Bursal Disease Virus. *Journal of Virology*, *75*(24), 11974–11982. https://doi.org/10.1128/jvi.75.24.11974-11982.2001

Brown, M. D., & Skinner, M. A. (1996). Coding sequences of both genome segments of a European "very virulent" infectious bursal disease virus. In *Virus Research* (Vol. 40).

Cheville, N. F. (1967). Studies on the Pathogenesis of Gumboro Disease in the Bursa of Fabricius, Spleen, and Thymus of the Chicken. *American Journal of Pathology*, *51*(4), 527–551.

Coulibaly, F., Chevalier, C., Gutsche, I., Pous, J., Navaza, J., Bressanelli, S., Delmas, B., & Rey, F. A. (2005). The birnavirus crystal structure reveals structural relationships among icosahedral viruses. *Cell*, *120*(6), 761–772. https://doi.org/10.1016/j.cell.2005.01.009

Delmas, B., Attoui, H., Ghosh, S., Malik, Y. S., Mundt, E., & Vakharia, V. N. (2019). ICTV virus taxonomy profile: Birnaviridae. *Journal of General Virology*, *100*(1), 5–6. https://doi.org/10.1099/jgv.0.001185

Deorao, C. V., Rajasekhar, R., Ravishankar, C., Nandhakumar, D., Sumod, K., Palekkodan, H., John, K., & Chaithra, G. (2021). Genetic variability in VP1 gene of infectious bursal disease virus from the field outbreaks of Kerala, India. *Tropical Animal Health and Production*, *53*(3). https://doi.org/10.1007/s11250-021-02852-7

Dey, S., Pathak, D., Ramamurthy, N., Maity, H. K., & Chellappa, M. M. (2019). Infectious bursal disease virus in chickens: prevalence, impact, and

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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management strategies. *Veterinary Medicine: Research and Reports*, *Volume 10*, 85–97. https://doi.org/10.2147/vmrr.s185159

Dwight, C. H., N M, J., & L W, R. (2004). *Veterinary microbiology* (2nd ed.). Blackwell.

Elankumaran, S., Heckert, R. A., & Moura, L. (2002). Pathogenesis and tissue distribution of a variant strain of infectious bursal disease virus in commercial broiler chickens. *Avian Diseases*, *46*(1), 169–176. https://doi.org/10.1637/0005-2086(2002)046[0169:PATDOA]2.0.CO;2

Eldaghayes, I., Rothwell, L., Williams, A., Withers, D., Balu, S., Davison, F., & Kaiser, P. (2006). Infectious bursal disease virus: Strains that differ in virulence differentially modulate the innate immune response to infection in the chicken bursa. *Viral Immunology*, *19*(1), 83–91. https://doi.org/10.1089/vim.2006.19.83

Escaffre, O., Le Nouën, C., Amelot, M., Ambroggio, X., Ogden, K. M., Guionie, O., Toquin, D., Müller, H., Islam, M. R., & Eterradossi, N. (2013). Both Genome Segments Contribute to the Pathogenicity of Very Virulent Infectious Bursal Disease Virus. *Journal of Virology*, *87*(5), 2767–2780. https://doi.org/10.1128/jvi.02360-12

Eterradosi, N., & Saif, Y. M. (2013). *Diseases of Poultry, 13th Edition* (D. E. Swayne, J. R. Glisson, L. R. Mcdougald, L. K. Nolan, D. L. Suarez, & V. L. Nair, Eds.; 13th ed., Vol. 7). Wiley-Blackwell.

Fahey, K. J., O'donnell, I. J., & Bagust, T. J. (1985). Antibody to the 32K Structural Protein of Infectious Bursal Disease Virus Neutralizes Viral Infectivity in vitro and Confers Protection on Young Chickens. In *J. gen. Virol*.

Fan, L., Wu, T., Hussain, A., Gao, Y., Zeng, X., Wang, Y., Gao, L., Li, K., Wang, Y., Liu, C., Cui, H., Pan, Q., Zhang, Y., Liu, Y., He, H., Wang, X., & Qi, X. (2019). Novel variant strains of infectious bursal disease virus isolated in China. *Veterinary Microbiology*, *230*, 212–220. https://doi.org/10.1016/j.vetmic.2019.01.023

Farooq, M., Durrani, F. R., Imran, N., Durrani, Z., & Chand, N. (2003). Prevalence and economic losses due to infectious bursal disease in broilers in Mirpur and Kotli districts of kashmir. *International Journal of Poultry Science*, *2*(4), 267–270. https://doi.org/10.3923/ijps.2003.267.270

Ferrero, D., Garriga, D., Navarro, A., Rodríguez, J. F., & Verdaguer, N. (2015). Infectious Bursal Disease Virus VP3 Upregulates VP1-Mediated RNA-

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Dependent RNA Replication. *Journal of Virology*, *89*(21), 11165–11168. https://doi.org/10.1128/jvi.00218-15

Fouad, A. M., Ruan, D., El Senousey, H. A. K., Chen, W., Jiang, S., & Zheng, C. (2019). Harmful effects and control strategies of aflatoxin B1 produced by aspergillus flavus and aspergillus parasiticus strains on poultry: Review. In *Toxins* (Vol. 11, Issue 3). MDPI AG. https://doi.org/10.3390/toxins11030176

Gao, L., Li, K., Qi, X., Gao, H., Gao, Y., Qin, L., Wang, Y., Shen, N., Kong, X., & Wang, X. (2014). Triplet amino acids located at positions 145/146/ 147 of the RNA polymerase of very virulent infectious bursal disease virus contribute to viral virulence. *Journal of General Virology*, *95*(PART 4), 888–897. https://doi.org/10.1099/vir.0.060194-0

Gilchrist, P. (2005). Involvement of free-flying wild birds in the spread of the viruses of avian influenza, Newcastle disease and infectious bursal disease from poultry products to commercial poultry. In *World's Poultry Science Journal* (Vol. 61, Issue 2, pp. 198–214). https://doi.org/10.1079/WPS200451

He, X., Xiong, Z., Yang, L., Guan, D., Yang, X., & Wei, P. (2014). Molecular epidemiology studies on partial sequences of both genome segments reveal that reassortant infectious bursal disease viruses were dominantly prevalent in southern China during 2000-2012. *Archives of Virology*, *159*(12), 3279–3292. https://doi.org/10.1007/s00705-014-2195-z

Hiraga, M., Nunoya, T., Otaki, Y., Tajima, M., Saito, T., & Nakamura, T. (1994). Pathogenesis of Highly Virulent Infectious Bursal Disease Virus Infection in Intact and Bursectomized Chickens. *Nippon Institute for Biological Science*, 1057–1063.

Hoque, M. M., Omar, A. R., Chong, L. K., Hair-Bejo, M., & Aini, I. (2001). Pathogenicity of SspI-positive infectious bursal disease virus and molecular characterization of the VP2 hypervariable region. *Avian Pathology*, *30*(4), 369–380. https://doi.org/10.1080/03079450120066377

Hossain, N., Islam, M. N., Mohammad, H., Salauddin, M., Kulsum, U., Hossain, M. N., & Harun-Ur-Rashid, S. M. (2018). Pathological Investigation of Infectious Bursal Disease (IBD) in Broiler at Dinajpur District. *IOSR Journal of Agriculture and Veterinary Science*, *11*(10), 73–79. https://doi.org/10.9790/2380-1110017379

Ignjatovic, J., Sapats, S., Reece, R., Gould, A., Gould, G., Selleck, P., Lowther, S., Boyle, D., & Westbury, H. (2004). Virus strains from a flock exhibiting

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Universitas Gadjah Mada, 2023 | Diunduh dari http://etd.repository.ugm.ac.id/

unusually high mortality due to infectious bursal disease. *Australian Veterinary Journal*, *82*(12), 763–768.

Ingrao, F., Rauw, F., Lambrecht, B., & Van den Berg, T. (2013). Infectious Bursal Disease: A complex host-pathogen interaction. *Developmental and Comparative Immunology*, *41*(3), 429–438. https://doi.org/10.1016/j.dci.2013.03.017

Islam, M., Rashid, S., Hoque, M., Juli, M., & Khatun, M. (2008). Pathogenicity of IBDV Related to Outbreaks in The Vaccinated Flocks and The Causes of Vaccinated Failure. *Journal of Innovation and Development Strategy*, *2*(3), 22–30. https://www.researchgate.net/publication/237574410

Islam, M. T., & Samad, M. A. (2004). Clinico-Pathological Studies on Natural and Experimental Infectious Bursal Disease in Broiler Chickens. *Bangladesh Journal of Veterinary Medicine*, *2*(1), 31–35.

Jackwood, D. J., Schat, K. A., Michel, L. O., & de Wit, S. (2018). A proposed nomenclature for infectious bursal disease virus isolates. *Avian Pathology*, *47*(6), 576–584. https://doi.org/10.1080/03079457.2018.1506092

Jackwood, D. J., & Sommer-Wagner, S. E. (2010). Detection and characterization of infectious bursal disease viruses in broilers at processing. *Preventive Veterinary Medicine*, *97*(1), 45–50. https://doi.org/10.1016/j.prevetmed.2010.07.010

Jackwood, D. J., & Sommer-Wagner, S. E. (2011). Amino acids contributing to antigenic drift in the infectious bursal disease Birnavirus (IBDV). *Virology*, *409*(1), 33–37. https://doi.org/10.1016/j.virol.2010.09.030

Jackwood, D. J., Sommer-Wagner, S. E., Crossley, B. M., Stoute, S. T., Woolcock, P. R., & Charlton, B. R. (2011). Identification and pathogenicity of a natural reassortant between a very virulent serotype 1 infectious bursal disease virus (IBDV) and a serotype 2 IBDV. *Virology*, *420*(2), 98–105. https://doi.org/10.1016/j.virol.2011.08.023

Jamal, M., shareef, M., & Sajid, S. (2017). Lincomycin and tetracycline resistance in poultry. Review. *Matrix Science Pharma*, *1*(1), 33–38. https://doi.org/10.26480/msp.01.2017.33.38

Jeurissen, S. H. M., Janse, E. M., Lehrbach, P. R., Haddad, E. E., Avakian, A., & Whitfill, C. E. (1998). The working mechanism of an immune complex vaccine that protects chickens against infectious bursal disease. In *Immunology* (Vol. 95).

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Universitas Gadjah Mada, 2023 | Diunduh dari http://etd.repository.ugm.ac.id/

Jindal, N., Mahajan, N. K., Mittal, D., Gupta, S. L., & Khokhar, R. S. (2004). Some epidemiological studies on infectious bursal disease in broiler chickens in parts of Haryana, India. *International Journal of Poultry Science*, *3*(7), 478–482. https://doi.org/10.3923/ijps.2004.478.482

Jonathan Badau, S., Usman Hassan, S., & El-Yuguda, A.-D. (2023). *Outbreaks of acute infectious bursal disease of chickens in Maiduguri, Nigeria (2008-2018): retrospective survey*. https://doi.org/10.21203/rs.3.rs-2305788/v1

Juranová, R., Nga, T., Kulíková, L., & Jurajda, V. (2001). Pathogenicity of Czech Isolates of Infectious Bursal Disease Virus. *Acta Veterinaria Brno*, *70*, 425–431. http://www.vfu.cz/acta-vet/actavet.htm

Kabell, S., Handberg, K. J., Li, Y., Kusk, M., & Bisgaard, M. (2005). Detection of vvIBDV in Vaccinated SPF Chickens. In *Acta vet. scand* (Vol. 46, Issue 4).

Kaufer, I., & Weiss, E. (1980). Significance of Bursa of Fabricius as Target Organ in Infectious Bursal Disease of Chickens. *Infection and Immunity*, *27*(2), 364–367. https://journals.asm.org/journal/iai

Kegne, T., & Chanie, M. (2014). Review on the Incidence and Pathology of Infectious Bursal Disease. *British Journal of Poultry Sciences*, *3*(3), 68–77. https://doi.org/10.5829/idosi.bjps.2014.3.3.8556

Khan, R. W., Anwar Khan, F., Farid, K., Khan, I., & Tariq, M. (2009). Prevalence of infectious bursal disease in broiler in District Peshawar. *ARPN Journal of Agricultural and Biological Science*, *4*(1). www.arpnjournals.com

Kim, I.-J., Karaca, K., Pertile, T. L., Erickson, S. A., & Sharma, J. M. (1998). *Enhanced expression of cytokine genes in spleen macrophages during acute infection with infectious bursal disease virus in chickens*.

Kulsum, U., Hossain, M. N., Harun-ur-Rashid, S., Islam, M. N., & Salaudin, M. (2018). Pathological Investigation Of Infectious Bursal Disease (IBD) In Broiler At Dinajpur District. *IOSR Journal of Agriculture and Veterinary Science*, *11*(10), 73–79.

Kumar, S., Stecher, G., Li, M., Knyaz, C., & Tamura, K. (2108). MEGA X: Molecular Evolutionary Genetics Analysis across computing platforms. *Molecular Biology and Evolution*, *35*(6), 1547–1549. https://doi.org/10.1093/molbev/msy096/4990887

Lam, K. M. (1997). Morphological Evidence of Apoptosis in Chickens Infected with Infectious Bursal Disease Virus. In *J. Comp. Path* (Vol. 116).

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Universitas Gadjah Mada, 2023 | Diunduh dari http://etd.repository.ugm.ac.id/

Latif, I. K., Majed, H. M., & Sahar, H. (2014). Determine the weight of thymus, bursa of Fabricius and spleen and its ratio to body weight in some diseases of broilers. *Mirror of Research in Veterinary Sciences and Animals*, *3*(1), 10–16. https://doi.org/10.22428/mrvsa

Lawal, J. R., Jajere, S. M., Bello, A. M., Mustapha, M., Wakil, Y., Ndahi, J. J., Mustapha, F. B., Pail, B. T., Gulani, I. A., Ibrahim, U. I., Geidam, Y. A., Ambali, A. G., & Waziri, I. (2014). Prevalence of Infectious Bursal Disease (Gumboro) Antibodies in Village Chickens in Gombe State, Northeastern Nigeria. *International Journal of Poultry Science* , *13*(12), 703–708.

Lejal, N., Da Costa, B., Huet, J.-C., & Delmas, B. (2000). Printed in Great Britain Role of Ser-652 and Lys-692 in the protease activity of infectious bursal disease virus VP4 and identification of its substrate cleavage sites. In *Journal of General Virology* (Vol. 81). www.bi.bbsrc.ac.uk

Letzel, T., Coulibaly, F., Rey, F. A., Delmas, B., Jagt, E., van Loon, A. A. M. W., & Mundt, E. (2007). Molecular and Structural Bases for the Antigenicity of VP2 of Infectious Bursal Disease Virus. *Journal of Virology*, *81*(23), 12827–12835. https://doi.org/10.1128/jvi.01501-07

Li, L., Kubasová, T., Rychlik, I., Hoerr, F. J., & Rautenschlein, S. (2018). Infectious bursal disease virus infection leads to changes in the gut associated-lymphoid tissue and the microbiota composition. *PLoS ONE*, *13*(2). https://doi.org/10.1371/journal.pone.0192066

Li, L., Pielsticker, C., Han, Z., Kubasová, T., Rychlik, I., Kaspers, B., & Rautenschlein, S. (2018). Infectious bursal disease virus inoculation infection modifies Campylobacter jejuni-host interaction in broilers. *Gut Pathogens*, *10*(1). https://doi.org/10.1186/s13099-018-0241-1

Liang, J., Yin, Y., Qin, T., & Yang, Q. (2015). Chicken bone marrow-derived dendritic cells maturation in response to infectious bursal disease virus. *Veterinary Immunology and Immunopathology*, *164*(1–2), 51–55. https://doi.org/10.1016/j.vetimm.2014.12.012

Librani, R., Setiyono, A., Winarsih, W., Universitas, F. P., Oleo, H., Mokodompit, J. H. E. A., Kendari, K., Patologi, B., Reproduksi, D. K., & Patologi, D. (2019). Studi Reseptor Virus Infectious Bursal Disease (IBD) pada Organ Limfoid Ayam Pasca Vaksinasi dengan Metode Imunohistokimia The Study of Infectious Bursal Disease (IBD) Virus recemor at chiken Lymphoid Organ after vaccination by Immunahistochemistry Method 1 2 2. *Jurnal Sain Veteriner*, *37*(1), 17–26. https://doi.org/10.22146/jsv.22324

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Luque, D., Rivas, G. N., Alfonso, C., Carrascosa, J. L., Rodríguez, J. F., & Castó, J. R. (2009). *Infectious bursal disease virus is an icosahedral polyploid dsRNA virus*. www.pnas.org/cgi/content/full/

Mahardika, I. G. N. K., & Parede, L. (2008). Phylogenetic Analysis of Nucleotide Sequence of Hipervariable Fragment of VP2 of Infectious Bursal Disease Virus Isolated in Indonesia. *Jurnal Veteriner*, *9*(2), 60–64. http://www.ebi.ac.uk/Tools/clustalw

Mahgoub, H. A. (2012). An overview of infectious bursal disease. In *Archives of Virology* (Vol. 157, Issue 11, pp. 2047–2057). Springer-Verlag Wien. https://doi.org/10.1007/s00705-012-1377-9

Mazengia, H., Tilahun, S. B., & Negash, T. (2009). Incidence of Infectious Bursal Diseasein Village Chickens in Two Districts of Amhara Region, Northwest Ethiopia. *Livestock Research for Ruler Development*, *21*(12).

Méndez, F., De Garay, T., Rodríguez, D., & Rodríguez, J. F. (2015). Infectious bursal disease virus VP5 Polypeptide: A phosphoinositide-binding protein required for efficient cell-to-cell virus dissemination. *PLoS ONE*, *10*(4). https://doi.org/10.1371/journal.pone.0123470

Michel, L. O., & Jackwood, D. J. (2017). Classification of infectious bursal disease virus into genogroups. *Archives of Virology*, *162*(12), 3661–3670. https://doi.org/10.1007/s00705-017-3500-4

Mittal, D., Jindal, N., Gupta, S. L., Kataria, R. S., & Tiwari, A. K. (2005). Detection of infectious bursal disease virus in field outbreaks in broiler chickens by reverse transcription-polymerase chain reaction. *International Journal of Poultry Science*, *4*(4), 239–243. https://doi.org/10.3923/ijps.2005.239.243

Muller, H., & Becht, H. (1982). Biosynthesis of Virus-Specific Proteins in Cells Infected with Infectious Bursal Disease Virus and Their Significance as Structural Elements for Infectious Virus and Incomplete Particles. *Journal of Virology*, *44*(1), 384–392.

Müller, H., Islam, M. R., & Raue, R. (2003). Research on infectious bursal disease - The past, the present and the future. In *Veterinary Microbiology* (Vol. 97, Issues 1–2, pp. 153–165). Elsevier. https://doi.org/10.1016/j.vetmic.2003.08.005

Müller, H., Mundt, E., Eterradossi, N., & Islam, M. R. (2012). Current status of vaccines against infectious bursal disease. *Avian Pathology*, *41*(2), 133–139. https://doi.org/10.1080/03079457.2012.661403

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GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Mundt, E., Beyer, I. J., & Miiller2t, H. (1995). Identification of a novel viral protein in infectious bursal disease virus-infected cells. In *Journal of General Virology* (Vol. 76).

Murphy, F., Gibbs, E., Horzinek, M., & Studdert, M. (1999). *Veterinary Virology* (3rd ed.). Academic Press.

Murugesan, G. R., Ledoux, D. R., Naehrer, K., Berthiller, F., Applegate, T. J., Grenier, B., Phillips, T. D., & Schatzmayr, G. (2015). Prevalence and effects of mycotoxins on poultry health and performance, and recent development in mycotoxin counteracting strategies. *Poultry Science*, *94*(6), 1298–1315. https://doi.org/10.3382/ps/pev075

Naqi, S., Thompson, G., Bauman, B., & Mohammed, H. (2001). The Exacerbating Effect of Infectious Bronchitis Virus Infection on the Infectious Bursal Disease Virus-Induced Suppression of Opsonization by Escherichia coli Antibody in. *Source: Avian Diseases*, *45*(1), 52–60.

Neto, S. H., Nmk, I., de A, L. E., Ara, C., GC, E., & MA, Z. (2004). Infectious Bursal Disease Virus: Case Report and Experimental Studies in Vaccinated and Unvaccinated SPF Chickens and Commercial Broiler Chicks. *Brazilian Journal of Poultry Science*, *6*(1), 41–54.

Nwagbo, I. O., Shittu, I., Nwosuh, C. I., Ezeifeka, G. O., Odibo, F. J. C., Michel, L. O., & Jackwood, D. J. (2016). Molecular characterization of field infectious bursal disease virus isolates from Nigeria. *Veterinary World*, *9*(12), 1420–1428. https://doi.org/10.14202/vetworld.2016.1420-1428

OIE. (2008). Infectious Bursal Disease (Gumboro Disease). *OIE Terrestrial Manual*, *3.3.12.*

Oluwayelu, D. O., Emikpe, B. O., Ikheloa, J. O., Fagbohum, O. A., & Adeniran, G. A. (2002). The Pathology of Infectious Bursal Disease in Crossbreeds of Harco Cocks and Indigenous Nigerian Hens. *African Journal of Clinical and Experimental Microbiology*, *3*(2).

Omer, M. G., & Khalafalla, A. I. (2022). Epidemiology and laboratory diagnosis of very virulent infectious bursal disease virus in vaccinated chickens in Khartoum, Sudan. *Open Veterinary Journal*, *12*(1), 33–43. https://doi.org/10.5455/OVJ.2022.v12.i1.5

Orakpoghenor, O., Oladele, S. B., & Abdu, P. A. (2020). Infectious Bursal Disease: Transmission, Pathogenesis, Pathology and Control - An Overview. *World's*

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Poultry Science Journal, *76*(2), 292–303. https://doi.org/10.1080/00439339.2020.1716652

Orakpoghenor, O., Oladele, S. B., Abdu, P. A., Markus, T. P., Andamin, A. D., & Esievo, K. A. N. (2021). Comparative Pathological Changes Induced by Very Virulent Infectious Bursal Disease Virus Infection in Inoculated, Sentinel Pigeons and Chickens. *Open Veterinary Science*, *2*(1), 55–64. https://doi.org/10.1515/ovs-2020-0108

Parede, L. H., Sapats, S., Gould, G., Rudd, M., Lowther, S., & Ignjatovic, J. (2003). Characterization of infectious bursal disease virus isolates from Indonesia indicates the existence of very virulent strains with unique genetic changes. *Avian Pathology*, *32*(5), 511–518. https://doi.org/10.1080/0307945031000154116

Petkov, D. I., Linnemann, E. G., Kapczynski, D. R., & Sellers, H. S. (2009). Identification and Characterization of Two Distinct Bursal B-Cell Subpopulations Following Infectious Bursal Disease Virus Infection of White Leghorn Chickens. *Avian Diseases Digest*, *4*(3), e4–e4. https://doi.org/10.1637/8964.1

Pikuła, A., Śmietanka, K., & Perez, L. J. (2020). Emergence and expansion of novel pathogenic reassortant strains of infectious bursal disease virus causing acute outbreaks of the disease in Europe. *Transboundary and Emerging Diseases*, *67*(4), 1739–1744. https://doi.org/10.1111/tbed.13510

Raja, P., Senthilkumar, T. M. A., Parthiban, M., Thangavelu, A., Gowri, A. M., Palanisammi, A., & Kumanan, K. (2016). Complete genome sequence analysis of a naturally reassorted infectious bursal disease virus from India. *Genome Announcements*, *4*(4). https://doi.org/10.1128/genomeA.00709-16

Rani, S., & Kumar, S. (2015). Evaluation of infectious bursal disease virus stability at different conditions of temperature and pH. *Biologicals*, *43*(6), 515–518. https://doi.org/10.1016/j.biologicals.2015.07.005

Rautenschlein, S., & Alkie, T. N. (2016). Infectious bursal disease virus in poultry: current status and future prospects. *Veterinary Medicine: Research and Reports*, 9. https://doi.org/10.2147/vmrr.s68905

Rauw, F., Lambrecht, B., & Berg, T. Van Den. (2007). Pivotal role of ChIFNγ in the pathogenesis and immunosuppression of infectious bursal disease. *Avian Pathology*, *36*(5), 367–374. https://doi.org/10.1080/03079450701589159

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Universitas Gadjah Mada, 2023 | Diunduh dari http://etd.repository.ugm.ac.id/

Rehman, Z. U., Meng, C., Umar, S., Munir, M., & Ding, C. (2016). Interaction of infectious bursal disease virus with the immune system of poultry. In *World's Poultry Science Journal* (Vol. 72, Issue 4, pp. 805–820). Cambridge University Press. https://doi.org/10.1017/S0043933916000775

Rudd, M. F., Heine, H. G., Sapats, S. I., Parede, L., & Ignjatovic, J. (2002). Characterisation of an Indonesian very virulent strain of infectious bursal disease virus. *Archives of Virology*, *147*(7), 1303–1322. https://doi.org/10.1007/s00705-002-0817-3

Sali, K. (2019). Overview of Methods Used in the Diagnosis of Infectious Bursal Disease. *Veterinary Medicine – Open Journal*, *4*(1), 9–17. https://doi.org/10.17140/VMOJ-4-131

Sassia, S., Nadir, A., & Ismahane, L. (2017). Diagnosis of chicken Gumboro disease by histopathological study of the bursa of Fabricius. *Revista Electronica de Veterinaria*, *18*(9), 1–9. http://www.veterinaria.org/revistas/redvet2017Volumen18Nº9-http://www.veterinaria.org/revistas/redvet/n090917.htmlhttp://www.veterinaria.org/revistas/redvet/n090917/091738.pdf

Sedeik, M. E., El-Shall, N. A., Awad, A. M., Abd El-Hack, M. E., Alowaimer, A. N., & Swelum, A. A. (2019). Comparative evaluation of HVT-IBD vector, immune complex, and live IBD vaccines against vvIBDV in commercial broiler chickens with high maternally derived antibodies. *Animals*, *9*(3). https://doi.org/10.3390/ani9030072

Sellaoui, S., Alloui, N., Mehenaoui, S., & Djaaba, S. (2012). Evaluation of Size and Lesion Scores of Bursa Cloacae in Broiler Flocks in Algeria. In *Journal of World's Poultry Research J. World's Poult. Res* (Vol. 2, Issue 2). http://jwpr.science-line.com/

Sharma, J. M., Dohms, J., Walser, M., & Snyder, D. B. (1993). Presence of Lesions without Virus Replication in the Thymus of Chickens Exposed to Infectious Bursal Disease Virus. *American Association of Avian Pathologists*, *37*(3), 741–748.

Sharma, J. M., Kim, I.-J., Rautenschlein, S., & Yeh, H.-Y. (2000). Infectious bursal disease virus of chickens: pathogenesis and immunosuppression. In *Developmental and Comparative Immunology* (Vol. 24). www.elsevier.com/locate/devcompimm

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Universitas Gadjah Mada, 2023 | Diunduh dari http://etd.repository.ugm.ac.id/

Singh, J., Banga, H. S., Brar, R. S., Singh, N. D., Sodhi, S., & Leishangthem, G. D. (2015). Histopathological and immunohistochemical diagnosis of infectious bursal disease in poultry birds. *Veterinary World*, *8*(11), 1331–1339. https://doi.org/10.14202/vetworld.2015.1331-1339

Singh, N. K., Dey, S., Madhan Mohan, C., Mohan Kataria, J., & Vakharia, V. N. (2010). Evaluation of four enzyme linked immunosorbent assays for the detection of antibodies to infectious bursal disease in chickens. *Journal of Virological Methods*, *165*(2), 277–282. https://doi.org/10.1016/j.jviromet.2010.02.008

Slaoui, M., & Fiette, L. (2011). Histopathology Procedures: From Tissue Sampling to Histopathological Evaluation. In *Methods in Molecular Biology* (Vol. 691, pp. 69–82). Humana Press Inc. https://doi.org/10.1007/978-1-60761-849-2_4

Sreedevi, B., Lefever, L. J., Sommer-Wagner, S. E., & Jackwood, D. J. (2007). Characterization of Infectious Bursal Disease Viruses from Four Layer Flocks in the United. *Avian Diseases*, *51*(4), 845–850.

Stoute, S. T., Jackwood, D. J., Sommer-Wagner, S. E., Crossley, B. M., Woolcock, P. R., & Charlton, B. R. (2013). Pathogenicity associated with coinfection with very virulent infectious bursal disease and Infectious bursal disease virus strains endemic in the United States. *Journal of Veterinary Diagnostic Investigation*, *25*(3), 352–358. https://doi.org/10.1177/1040638713483538

Tabbu, C. (2000). *Penyakit Ayam dan Penanggulangannya* (Vol. 1). Kanisius.

Tacken, M., Rottier, P., Gielkens, A., & Pieeters, B. (2000). Interactions in vivo between the proteins of infectious bursal disease virus: capsid protein VP3 interacts with the RNA-dependent RNA polymerase, VP1. *The Journal of General Virology*, *81*(Pt 1), 209–218.

Taghavian, O., Aus Teheran, I., Berichter, :, Universitätsprofessor, R., Fischer, H., & Schillberg, S. (2013). *Expression and Characterization of Infectious Bursal Disease Virus Protein for Poultry Vaccine Development and Application in Nanotechnology*.

Tammiranta, N., Ek-Kommonen, C., Rossow, L., & Huovilainen, A. (2018). Circulation of very virulent avian infectious bursal disease virus in Finland. *Avian Pathology*, *47*(5), 520–525. https://doi.org/10.1080/03079457.2018.1503642

UNIVERSITAS
GADJAH MADA
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Tanimura, N., & Sharma, J. M. (1998). In-situ Apoptosis in Chickens Infected with Infectious Bursal Disease Virus. *Journal of Comparative Pathology* , *1*, 15–27.

van den Berg, T., Eterradossi, N., Toquin, D., & Meulemans, G. (2000). Infectious bursal disease (Gumboro disease). *Revue Scientifique et Technique*, *19*(2), 509–543.

von Einem, U. I., Gorbalenya, A. E., Schirrmeier, H., Behrens, S. E., Letzel, T., & Mundt, E. (2004). VP1 of infectious bursal disease virus is an RNA-dependent RNA polymerase. *Journal of General Virology*, *85*(8), 2221–2229. https://doi.org/10.1099/vir.0.19772-0

Wahyuwardani, S., Agungpriyono, D., Parede, L., Manalu, dan W., & Besar Penelitian Veteriner, B. (2011). *Penyakit Gumboro: Etiologi, Epidemiologi, Patologi, Diagnosis dan Pengendaliannya*.

Wang Yu long, Fan, L. jin, Jian, N., Gao, L., Li, K., Gao, Y. long, Liu, C. jun, Cui, H. yu, Pan, Q., Zhang, Y. ping, Wang, X. mei, & Qi, X. le. (2021). An improved scheme for infectious bursal disease virus genotype classification based on both genome-segments A and B. *Journal of Integrative Agriculture*, *20*(5), 1372–1381. https://doi.org/10.1016/S2095-3119(20)63424-4

Wibowo, M., Anggoro, D., Wibowo, S., Santosa, P., Amanu, S., & Asmara, W. (2017). Analisis Fragmen Gen VP-2 Virus Infectious Bursal Diseases yang Diisolasi dari Peternakan Ayam Komersial. *Acta Veterinaria Indonesiana*, *5*(1), 47–56. http://www.journal.ipb.ac.id/indeks.php/actavetindones

Wibowo, M. H., Fadiar, R., Anggoro, D., Artanto, S., Amanu, S., Endang Tri Hastuti Wahyuni, A., Mikrobiologi, D., Kedokteran Hewan, M., Program Studi Sain Veteriner, M., Kedokteran Hewan, F., Jln Fauna No, U., & Sain Veteriner, J. (2015). Molecular Detection of Infectious Bursal Disease Virus at Bursal Fabricius Samples Obtained from Chicken Suspected to IBD Infection. *Jurnal Sain Veteriner*, *33*(2).

Wibowo, M. H., Sahesty, A., Mahardika, B. K., Purwanto, B., Lestariningsih, C. L., Suardana, I. B. K., Winaya, I. B. O., Irene, I., Suryanggono, J., Jonas, M., Murwijati, T., & Mahardika, G. N. (2019). Epizootiology, Clinical Signs and Phylogenetic Analysis of Fowl Adenovirus in Chicken Farms in Indonesia from 2018 to 2019. *Avian Diseases*, *63*, 619–624.

Ye, C., Jia, L., Sun, Y., Hu, B., Wang, L., Lu, X., & Zhou, J. (2014). Inhibition of Antiviral Innate Immunity by Birnavirus VP3 Protein via Blockage of Viral

UNIVERSITAS
GADJAH MADA
Gambaran Patologis dan Karakterisasi Molekuler Gen VP1 Virus Infectious Bursal Disease (IBD) pada Ayam Broiler Komersil
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Double-Stranded RNA Binding to the Host Cytoplasmic RNA Detector MDA5. *Journal of Virology*, *88*(19), 11154–11165. https://doi.org/10.1128/jvi.01115-14

Yu, F., Ren, X., Wang, Y., Qi, X., Song, J., Gao, Y., Qin, L., Gao, H., & Wang, X. (2013). A single amino acid V4I substitution in VP1 attenuates virulence of very virulent infectious bursal disease virus (vvIBDV) in SPF chickens and increases replication in CEF cells. *Virology*, *440*(2), 204–209. https://doi.org/10.1016/j.virol.2013.02.026

Yunus, A. W., Nasir, M. K., Aziz, T., & Böhm, J. (2009). Prevalence of Poultry Diseases in District Chakwal and Their Interaction with Mycotoxicosis: 2. Effects of Season and Feed. *The Journal of Animal & Plant Sciences*, *19*(1), 1–5.

Zannah, M., Awaludin, A., Rukmi, D. L., Nusantoro, S., & Kusuma, S. B. (2020). Case Study on Genesis Infectious Bursal Disease (IBD) on Broiler chickens at PT. Aretha Nusantara Farm Bandung. *Journal of Livestock Science and Production*, *4*(1).

Zeleke A, Gelaye E, Sori T, Ayelet G, Sirak A, & Zekarias B. (2005). Investigation on infectious bursal disease outbreak in DebreZeit, Ethiopia. *International Journal of Poultry Sciences*, *4*(7), 504–506.

Zeryehun, T., Hair-Bejo, M., & Rasedee, A. (2012). Hemorrhagic and Clotting Abnormalities in Infectious Bursal Disease in Specific-Pathogen-Free Chicks. *World Applied Sciences Journal*, *16*(8), 1123–1130.

Zhang, W., Wang, X., Gao, Y., & Qi, X. (2022). The Over-40-Years-Epidemic of Infectious Bursal Disease Virus in China. In *Viruses* (Vol. 14, Issue 10). MDPI. https://doi.org/10.3390/v14102253