

DAFTAR PUSTAKA

- Abdel-Tawwab, M., A.M. Abdel-Rahman, N.E.M Ismael. 2008. Evaluation of commercial live bakers' yeast, *Saccharomyces cerevisiae* as a growth and immunity promoter for fry Nile Tilapia *Oreochromis niloticus* (L) challenged in situ with *Aeromonas hydrophila*. *Aquaculture* 280: 185-189.
- Afriza, Dwiki.2018. Pengaruh penggunaan microbubble generator dan probiotik terhadap pertumbuhan nila merah (*Oreochromis sp.*) nilasa pada pendederan IV. Skripsi. Fakultas Pertanian Universitas Gadjah Mada.
- Alfoldy, P. and E.M. Lemmel. 1979. Reduction of Nitroblue tetrazolium for functional evaluation of activated macrophages in the cell-mediated immune reaction. *Clin. Immunol. Immunopathol.* 12 : 263.
- Ambara, I Putu Sattwika. 2017. Pengaruh microbubble generator terhadap kualitas air dan pertumbuhan lele (*Clarias sp*) yang dipelihara pada kedalaman yang berbeda. Skripsi.Fakultas Pertanian Universitas Gadjah Mada
- Badan Standarisasi Nasional (BSN). 1999. SNI 6141 produksi ikan nila (*Oreochromis niloticus*, Bleeker) kelas pembesaran di kolam air tenang. Badan Standarisasi Nasional. Jakarta.
- Balcazar JL, Decamp O, Vendrell D, de Blas I & Ruiz-Zarzuola I. 2006. Health and nutritional properties of probiotics in fish and shellfish. *Microb Ecol Health Dis* 18: 65–70
- Beauchamp, C. and I. Fridovich. 1971. Superoxide dismutase : improved assays and an assay applicable to acrylamide gel. *Analytical Biochemistry* 44 : 276 – 287.
- Bedasso, G. T. 2017. A study of immune response in nile tilapia (*Oreochromis niloticus*) fed levamisole incorporated diet. *J Immunol Infect Dis* 4(1): 103
- Bertini R., M. Bianci& P. Ghezzi. 1988. Adrenalectomy sensitizes mice to lethal effects of interleukin-1 and tumor-necrosis factor. *J Exp Med* 167:1702-1712.
- Bhatnagar A, & G. Singh. 2010. Culture fisheries in village ponds: a multi-location study in Haryana, India. *Agric Biol J N Am.* 1(5):961–968
- Boyd, C.E. 1998. Water quality for Pond Aquaculture. International Center for Aquaculture and Aquatic Environments, Alabama Agricultural Experiment Station, Auburn University. 37 pp.
- Brandtzaeg P., H. Kiyono, R. Pabst & M. W. Russell. 2008. Terminology: nomenclature of mucosa-associated lymphoid tissue. *Mucosal Immunol* 1 : 31-37.

- Briggs, R.T., Drath, D.B., Karnovsky, M.L., Karnovsky, M.J., 1975. Localization of NADH oxidase on the surface of human polymorphonuclear leukocytes by a new cytochemical method. *J. Cell. Biol.* 67, 566–586.
- Brown AC, Valiere A. 2004. Probiotics and medical nutrition therapy. *Nutrition in Clinical Care* 7(2):56-68
- Brunt, J., A. Newaj-Fyzul, B. Austin. 2007. The development of probiotics for the control of multiple bacterial diseases of rainbow trout, *Oncorhynchus mykiss* (Walbaum). *J Fish Dis* 30:573-579
- Bryan R, Soderberg W, Blanchet H, Sharpe WE. 2011. Management of Fish Ponds in Pennsylvania. <http://www.waterrresearch.net/Waterlibrary/Lake/waterqualityponds.pdf>. Diakses pada 20 April 2019.
- Budhijanto, W., Deendarlianto, Y.S. Pradana & M. Hartono. 2017. Application of micro bubble generator as low cost and high efficient aerator for sustainable fresh water fish farming. *AIP Conference Proceedings* 1840 : 110008-1 – 110008-8. American Institute of Physics.
- Choi SH & T.J. Yoon. 2008. Non-specific immune response of rainbow trout (*Oncorhynchus mykiss*) by dietary heat-inactivated potential probiotics. *Immune Netw* 8(3) : 67-74
- Clauss, T.M., A.D. Dove and J.E. Arnold. 2008. Hematologic disorders of fish. *Veterinary Clinics Exotic Animal Practice* 11 : 445-462.
- Crane B. 2006. Results of Water quality Measurements in Messer Pond. <http://www.messerpond.org/Ecology/WaterSamplingSummary.pdf>. Diakses pada 20 April 2019.
- Dar, G.H., S.A. Dar, A.N. Kamili, M.Z. Chisti & F. Ahmad. 2016. Detection and characterization of potentially pathogenic *Aeromonas sobria* isolated from fish *Hypophthalmichthys molitrix* (Cypriniformes : Cyprinidae). *Microbial Pathogenesis* 91:136-140
- Das S, L.R. Ward, C. Burke. 2008. Prospects of using marine Actinobacteria as probiotics in aquaculture. *Appl Microbiol Biotechnol* 81:419-429.
- Davis, A.K., D.L. Maney and J.C. Maerz. 2008. The use of leukocyte profiles to measure stress in vertebrates: a review for ecologists. *Functional Ecology* 22 : 760-772.
- Deendarlianto, Wiratni, A.E. Tontowi, Indarto dan A.G.W. Iriawan. 2015. The Implementation of a Developed Microbubble Generator on the Aerobic Wastewater Treatment. *International Journal of Technology.* 6 : 924-930.

- Dotta, G., J. L. P. Mourino, A. Jatoba, R. Ernesto, B. Moran, C. Pilati & M. L. Martins. 2011. Acute inflammatory response in Nile tilapia fed probiotic *Lactobacillus plantarum* in the diet. *Acta Scientiarum-Biological Sciences* 33 (3) : 239-246.
- El Adab, S., I. Essid and M. Hassouna. 2014. Effect of starter cultures on microbial and physicochemical parameters of a dry fermented poultry meat sausage. *Afr. J. Biotechnol.* 13 : 4155–4164.
- Elkamel, A.A. & G.M. Mosaad. 2012. Immunomodulation of Nile tilapia, *Oreochromis niloticus*, by *Nigella sativa* and *Bacillus subtilis*. *J Aquacult Res Dev* 3:147. doi:10.4172/2155-9546.1000147
- Esteban, M.A., A. Cuesta, E. Chavez-Pozo and J. Meseguer. 2015. Phagocytosis in Teleosts, Implications of the New Cells Involved. *Review. Biology* 4 : 907-922
- Esteban, M.A. & J. Meseguer. 1997. Factors influencing phagocytic response of macrophages from the sea bass (*Dicentrarchus labrax* L.): an ultrastructural and quantitative study. *The Anatomical Record* 248 : 533-541.
- Fedorack RN, Madsen KL. 2004. Probiotics as Modulators of the Gut Flora. *Br J Nutr* 88-Suppl 1:S39-49
- Fuller, R. 1987. A review, probiotics in man and animals. *Journal of Applied Bacteriology*, 66: 365-378
- Gil-Turnes, C., Conceição, F.R., Gil De Los Santos, J.R., 2007. *Bacillus cereus* var. *toyoi* improves feed efficiency and health in animals. *Int. J. Probiotics Prebiotics* 2 : 21–28.
- Gómez, G.D. & J.L. Balcazar. 2007. A Review on The interactions between gutmicrobiota and innate immunity of fish. *Immunology Medicine Microbiology*. 52: 145–154.
- Graham, J. B., 1997. Air-breathing Fishes: Evolution, diversity, and adaptation. Academic Press, San Diego.
- Groff, J.M. and Zinkl, J.G. 1999. Hematology and clinical chemistry of cyprinid fish common carp and goldfish. *Veterinary Clinics of North America: Exotic Animal Practice* 2 : 741-776.
- Guo, J.J., K.F. Liu, S.H. Cheng, C. Chang, J.J. Lay, Y.O. Hsu, J. Y. Yang and T.Y. Chen. 2009. Selection of probiotic bacteria for use In shrimp larviculture. *Aquaculture Research*. Blackwell Publishing. 40 : 609-618.
- Halliwell, B. 2006. Reactive species and antioxidants: Redox biology is a fundamental theme of aerobic life. *Plant Physiology* 141: 312–322.
- Hardy, H. , J. Harris, E. Lyon, J. Beal & A.D. Foey. 2013. Probiotics, prebiotics and

- immunomodulation of gut mucosal defenses: homeostasis and immunopathology. *Nutrients* 5:1869-1912.
- Hastuti, S.D. dan Karoror, R.J. 2007. Pengaruh Pemberian LPS (Lipopolisakarida) terhadap Aktivitas Fagositosis dan Jumlah Eritrosit Darah Ikan Nila (*Oreochromis sp.*). *Jurnal Protein* 15 (1): 10-5
- Harikrishnan R., Kim M., Kim J., Balasundaram C., Heo M. (2011). Immunomodulatory effect of probiotics enriched diets on *Uronema marinum* infected olive flounder. *Fish Shellfish Immunol.* 30964–971.
- Herich R & Levkut M. 2002. Lactic acid bacteria, probiotics and immune system. *Vet.Med* 47(6):169-180.
- Huising MO, Stolte E, Flik G, Savelkoul HFJ & Verburg-van Kemenada BML. 2003. CXC chemokines and leukocyte chemotaxis in common carp (*Cyprinus carpio* L.). *Dev Comp Immunol* 27: 875–888.
- Ighodaro, O.M. and O.A. Akinloye. 2018. First line defence antioxidants-superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX) : Their fundamental role in the entire antioxidant defence grid. *Alexandria Journal of Medicine* 54 : 287 - 293
- Irianto, A. 2005. *Patologi Ikan Teleostei*. Gadjah Mada University Press. Yogyakarta.
- Irianto, A. 2002. *Probiotik Akuakultur*. Gadjah Mada University Press. Yogyakarta.
- Isnansetyo, A., A. Fikriyah, N. Kasanah, Murwantoko. 2015. Non-specific immune potentiating activity of fucoidan from a tropical brown algae (Phaeophyceae), *Sargassum cristaefolium* in tilapia (*Oreochromis niloticus*). *Aquacult Int.* 24 (2) : 465-477
- Isnansetyo, A., H.M. Irpani, T.A. Wulansari, and N. Kasanah. 2014. Oral Administration of alginate from A Tropical Brown Seaweed, *Sargassum sp.* to Enhance Non-Specific Defence in Walking Catfish (*Clarias sp.*). *Aquacultura Indonesiana.* 2:49-55.
- Istiqomah, I. Deendarlianto, Alim I., Wiratni, Rustadi & S. Indarti. 2018. Smart aquaculture to improve production of high quality tilapia (*Oreochromis sp.*) meat in earthen pond : a combination of microbubble aeration system and fish gut probiotic. *Asia Pacific Conference on Food Security 2018*. Selangor, Malaysia.
- Jawad, L.A., M.A. Al-Mukhtar and H.K. Ahmed. 2004. The relationship between haematocrit and some biological parameters of the Indian shad, *Tenulosa ilisha* (Family Clupeidae). *Animal Biodiversity and Conservation* 27 (2) : 47-52.
- Karlmark, K.R., F. Tacke and R. Dunay. 2012. Monocytes in Health and Disease –

- Minireview. *European Journal of Microbiology and Immunology* 2 (2) : 97-102.
- Kausar R. & M. Salim . 2006. Effect of water temperature on growth performance and feed conversion ratio of *Labeo rohita*. *J. Pakistan Veteterina* 26(3): 105-108
- Katellaris, P.H. 1996. Probiotic Control of Diarrhoeal Disease. *Asia Pacific J Clin Nutr*, 5:39-43
- Kazuń, B. J. Malaczewska, K. Kazuń, J. Zylinska-Urbań & A. K. Siwicki. 2018. Immune-enhancing activity of potential probiotic strains of *Lactobacillus plantarum* in the common carp (*Cyprinus carpio*) fingerling. *J Vet Res* 62 : 485-492.
- Kesarcodi-Watson A, Kaspar H, Lategan MJ, Gibson L. 2008. Probiotics in aquaculture: the need, principles and mechanisms of action and screening processes. *Aquaculture* 274:1-14
- Khairuman, dan K. Amri. 2002. *Budidaya Lele Dumbo Secara Intensif*. Agro Media Pustaka. Jakarta.
- Kharisma, A., dan A. Manan. 2012. Kelimpahan bakteri vibrio sp. pada air pembesaran udang vannamei (*Litopenaeus vannamei*) sebagai deteksi dini serangan penyakit vibriosis. *Jurnal Ilmiah Perikanan dan Kelautan*, 4 (2) : 129-134.
- Khasani, I. 2007. Aplikasi Probiotik Menuju Sistem Budidaya Perikanan Berkelanjutan. *Media Akuakultur* 2(2):1-3
- Khusro, A., C. Aarti, A. Dusthacker and P. Agastian. 2018. Anti-tubercular and probiotic properties of coagulase-negative staphylococci isolated from Koozh, a traditional fermented food of South India. *Microbial Pathogenesis* 114 : 239-250.
- Kordi, K.M.Ghufran. 2013. *Farm Big Book: Budidaya Ikan Konsumsi Air Tawar*. Lily Publisher. Yogyakarta.
- Li, P and D.M. Gatlin III. 2006. Nucleotide nutrition in fish: Current knowledge and future application. *Aquaculture* 251 : 141 – 152
- Liu, C., T. Hiroshi, J. Zhang, L. Zhang, J. Yang, X. Huang and N. Kubota. 2013. Successful Application of Shirasu Porous Glass (SPG) Membrane System for Microbubble Aeration in Biofilm Reactor Treating Synthetic Wastewater. *Separation and Purification Technology*, 103: 53-59.
- MacArthur, J.I., & T.C. Fletcher. 1985 Phagocytosis in fish. In: *Fish Immunology*. M.F. Tatner and M.J. Manning, eds. Academic Press, London, pp. 29–46.
- Magnadottir, B. 2006. Innate immunity of fish (overview). *Fish and Shellfish Immunology*

20 : 137–151.

- Mazrouh, M.M., E.M. Amin, M.A. Hegazi, K.A. Hussien and Z.I. Attia. 2015. Some haematological parameters and blood picture of *Oreochromis niloticus* in Manzalah Lake, Egypt. *Journal of Environmental Science, Toxicology and Food Technology* 9 (5) : 11-19.
- Meyer, G. 2011. Immunology – Chapter One : Innate (Nonspecific) Immunity. *Microbiology and Immunology Online Textbook*. USC School of Medicine. <http://pathmicro.med.c.edu/ghaffar/innate.htm>. Diakses pada 12 Juli 2017.
- Nayak, S.K. 2010. Probiotics and immunity : a fish perspective. *Fish & Shelfish Immunology* 29 : 2-14.
- Neumann, N.F., Stafford, J.L., Barreda, D., Ainsworth, A.J., Belosevic, M., 2001. Antimicrobial mechanisms of fish phagocytes and their role in host defense. *Dev. Comp. Immunol.* 25, 807–825.
- Ngugi, C.C., R.B. James, O.O. Bethuel. 2007. *A New Guide to Fish Farming in Kenya*, Oregon State University, USA.
- Nurhayati S, Kisananto T, Syaifudin M. 2011. Superoksida dismutase (SOD): apa dan bagaimana peranannya dalam radioterapi. *Buletin Alava* 13: 67–74.
- Nussey, G., J.H.J. Vanvuren, & H.H. Dupreez. 1995. Effect of copper on the differential white blood cell counts of the Mozambique tilapia (*Oreochromis mossambicus*). *Comparative Biochemistry and Physiology C* 111 : 381–388.
- Ode, I. 2013. Kajian sistem imunitas untuk pengendalian penyakit pada ikan dan udang. *Jurnal Ilmiah Agribisnis dan Perikanan* 6 (2) : 41-43
- Oliva, A. and Teles. 2012. Nutrition and health of aquaculture fish. *Journal of Fish Diseases*. 35: 83–108.
- Panigrahi A, Kiron V, Kobayashi T, Puangkaew J, Satoh S, Sugita H. 2004. Immune responses in rainbow trout *Oncorhynchus mykiss* induced by a potential probiotic bacteria *Lactobacillus rhamnosus* JCM 1136. *Vet Immunol Immunopathol* 102:379-388
- Panigrahi A, Kiron V, Puangkaew J, Kobayashi T, Satoh S, Sugita H. 2005. The viability of probiotic bacteria as a factor influencing the immune response in rainbow trout *Oncorhynchus mykiss*. *Aquaculture* 243:241-254.
- Peraturan Pemerintah Nomor 82. 2001. *Pengelolaan Kualitas Air dan Pengendalian Pencemaran Air*.

- Pieters, N., J. Brunt, B. Austin and A.R. Lyndon. 2008. Efficacy of in-feed probiotics against *Aeromonas bestiarum* and *Ichthyophthirius multifiliis* skin infections in rainbow trout (*Oncorhynchus mykiss*, Walbaum) *Journal of Applied Microbiology* 105 : 723-732.
- Press C.M. & Ø. Evensen. 1999. The morphology of the immune system in teleost fishes. *Fish Shellfish Immunol* 9 : 309-318.
- Rahmaningsih, S. 2016. Hama dan Penyakit Ikan. Deepublisher. Yogyakarta.
- Rauta, R. P., B. Nayak & S. Das. 2012. Immune System and Immune Responses in Fish and their role in comparative immunity study: a model for higher organisms. *Immunology Letters*. 148: 23– 33.
- Raptaotan, F. 2018. Pengaruh penggunaan microbubble generator dan probiotik terhadap kualitas air pada pendederan IV. Skripsi. Fakultas Pertanian Universitas Gadjah Mada.
- Riche, M. & D. Garling. 2003. Feeding Tilapia in intensive recirculating system. NCRAC Extension Fact Sheets 6. http://lib.dr.iastate.edu/ncrac_factsheets/6
- Roissart, De H. & F.M. Luquet. 1994. Bactéries lactiques: Aspects fondamentaux et technologiques 2: 169-182.
- Ross, L.G. 2002. Environmental physiology and energetics. *Fish and Fisheries Series* 25 : 89-128.
- Rombout, H.W.M, L. Abelli, S. Picchietti, G. Scapigliati & V. Kiron. 2011. Teleost intestinal immunology. *Fish Shellfish Immunol* 31: 616-626
- Rukmini, M.S., B. D'Souza & V. D'Souza. 2004. Superoxide dismutase and catalase activities and their correlation with malondialdehyde in schizophrenic patients. *Indian Journal of Clinical Biochemistry* 19 (2) : 114-118.
- Santhosh B & N.P. Singh. 2007. Guidelines for water quality management for fish culture in Tripura, ICAR Research Complex for NEH Region, Tripura Center, Publication no.29.
- Sharifuzzaman SM & B. Austin. 2009 Influence of probiotic feeding duration on disease resistance and immune parameters in rainbow trout. *Fish Shellfish Immunol* 27:440-445
- Sebastiao, F.A., D. Nomura, R. Sakabe and F. Pilarski. 2011. Hematology and productive performance of Nile tilapia (*Oreochromis niloticus*) naturally infected with *Flavobacterium columnare*. *Brazilian Journal of Microbiology* 42 : 282-289.
- Secombes, C.J. and T.C. Fletcher. 1992. The role of phagocytes in the protective mechanisms of fish. *Annual Rev. of Fish Diseases* pp. 53-71. Pergamon Press Ltd.

- SIDATIK. 2018. Satu Data Produksi Kelautan dan Perikanan Tahun 2017. Pusat Data, Statistik, dan Informasi Kementerian Kelautan dan Perikanan (Pusdatin-KKP). <http://sidatik.kkp.go.id/>. Diakses pada 16 Juni 2019.
- Siwicki, A.K., M. Studnicka, M. Morand, F. Pozet & E. Terech-Majewska. 1998. Comparative immunotoxicology - a new direction. *Acta Vet. Brno* 67 : 295 – 301.
- Subramanian, S., S.L. Mackinnon, and N.W. Ross. 2007. A comparative study on innate immune parameters in the epidermal mucus of various fish species. *Comparative Biochemistry and Physiology B* 148 : 256–263.
- Subramanian, S., N.W. Ross, S.L. Mackinnon .2008. Comparison of antimicrobial activity in the epidermal mucus extracts of fish. *Comparative Biochemistry and Physiology B* 150 : 85–92
- Sukardi, P., P. H. T. Soedibya dan T.B. Pramono. 2018. Produksi budidaya ikan nila (*Oreochromis niloticus*) sistem bioflok dengan sumber karbohidrat berbeda. *Asian Journal of Innovation and Entrepreneurship* 3 (2) : 198 -203.
- Sun, Y.Z., H.L. Yang, R.L. Ma, K. Song & J.S. Li. 2011. Effect of *Lactococcus lactis* and *Enterococcus faecium* on growth performance, digestive enzymes and immune response of grouper *Ephinephelus coioides*. *Aquaculture Nutrition* 1-8. doi: 10.1111/j.1365-2095.2011.00894.x
- Suyanto. 2003. Pembenuhan dengan Pembesaran Nila. Penebar Swadaya. Jakarta.
- Tsutsumi, H. & Takase, I. 2015. Microbubble-generating apparatus.
- Tizard, I. 1987. Pengantar imunologi Veteriner. Universitas Airlangga Press. Surabaya.
- Tort, L., J. C. Balasch, S. Mackenzie. 2003. Fish Immune System. A Crossroads Between Innate and Adaptive Responses. *Inmunología*. 22(3): 277-286.
- Uribe, C., H. Folch, R. Enriquez and G. Moran. 2011. Innate and adaptive immunity in teleost fish : a review. *Veterinari Medicina* 56 (10) : 486-503
- Van Hai, Ngo. 2015. Research findings from the use of probiotics in tilapia aquaculture: A review. *Fish & Shellfish Immunology*, 45 : 592-597
- Verschuere L, Rombaut G, Sorgeloos P, Verstraete W. 2000. Probiotic bacteria as biological control agents in aquaculture. *Microbiol Mol Biol Rev* 64:655-71
- Whyte SK. 2007. The innate immune response of finfishes : A review of current knowledge. *Fish and Shellfish Immunology* 23 : 1127–1151.
- Williams, L.D., Burdock, G.A., Jiménez, G., Castillo, M. 2009. Literature review on the

safety of Toyocerin®, a non-toxigenic and non-pathogenic *Bacillus cereus* Var. *toyoi* preparation. Regul. Toxicol. Pharmacol. 55, 236–246. <http://dx.doi.org/10.1016/j.yrtph.2009.07.009>

Zexia, G., W. Weimin, Y. Yi, K. Abbas, L. Dapeng, Z. Guiwei and J.S. Diana. 2007. Morphological studies of peripheral blood cells of the Chinese sturgeon, *Acipenser sinensis*. Fish Physiol Biochem 33 : 213-222.