DAFTAR PUSTAKA

Abbass, A., Sharifuzzaman, S.M and ustin, B. 2010. Cellular components of probiotics control *Yersinia ruckeri* infection in rainbow trout, *Oncorchynchus mykiss* (Walbaum). *Fish Dis.* 33:31-37.

Abele, D and Puntarulo, S. 2004. Formation of reactive species and induction of antioxidant defence systems in polar and temperate marine invertebrates and fish. *Comp. Biochem. Physiol* 138:405-15.

Aguirre-Guzman, G., J.G. Sanchez-Martinez., A.I. Campa-Cordova., A. Luna-Gonzalez and F. Ascencio. 2009. Penaeid Shrimp Immune System. *Thai J. Vet. Med.* 39(3):205-215.

Ai, H.S., Huang, Y.C., Li, S.D., Weng, S.P., Yu, X.Q and He, J.G. 2008. Characterization of a prophenoloxidase from hemocytes of the shrimp *Litopneaeus vannamei* that is down-regulated by white spot syndrome virus. *Fish Shellfish Immunol.* 25:28-39.

Ai, H.S., Liao, J.X., Huang, X.D., Yin, Z.X., Weng, S.P., Zhao, Z.Y. *et al*. 2009. A novel prophenoloxidase 2 exists in shrimp hemocytes. *Dev Com Immunol.* 33:59-68.

Aiken, D. 1990. Shrimp farming in equator.*World Aquaculture* 21: 48-55.

Aksono, E.B. 2005.Analisis Protein *Envelope* VP28 *White Spot Baculovirus* Isolat Lokal Dari Udang Windu *(Penaeus monodon)* dan Uji Sebagai Kandidat Imunostimulan [DISERTASI].Program Pascasarjana Universitas Airlangga Surabaya.

Alenton, R.R., Koiwai, K., Miyaguchi, K., Kondo, H and Hirono, I. 2017. Pathogen recognition of a novel C-type Lectin from *Marsupenaeus japonicas* reveals the divergent sugar-binding specificity of QAP motif. *Sci Rep* 7:458 18.

Allameh S.K., F.M. Yusoff., E. Ringo., H.M. Daud., C.R. Saad and A. Ideris. 2016. Effects of dietary mono- and multiprobiotic strains on growth performance, gut bacteria and body consumption of Javanese carp *(Puntius gonionotus* Bleeker 1850).*Aquac.Nutr*.22: 367-373.

Amparyup *et al*. 2009. Two prophenoloxidases are important for the survival of *Vibrio harveyi* challenged shrimp *Penaeus monodon*. *Dev Com Immunol.* 33:247-56.

_____. 2013. Prophenoloxidase system and its role in shrimp immune responses against major pathogens. *Fish Shellfish Immunol.* 34:990-1001.

Amparyup, P., Sutthangkul, J., Charoensapsri, W and Tassanakajon, A. 2012. Pattern recognition protein binds to lipopolysaccharide and beta-1,3-

glucan and activates shrimp prophenoloxidase system. *Biol Chem* 287:10060-9.

Amri, Khairul dan Iskandar Kanna. 2008. *Budidaya Udang Vaname.* PT. Gramedia Pustaka Utama, Jakarta.

Amrillah, A.M., S. Widyarti dan Y. Kilawati. 2015. Dampak Stress Salinitas Terhadap Prevalensi *White Spot Syndrome Virus* (WSSV) dan *Survival Rate* Udang Vannamei *(Litopenaeus vannamei)* pada Kondisi Terkontrol. *Res J of Lif Sci* 2(1): 110-124.

Andy. 2002. *Udang Vannamei*. Harapan Baru. Kompas.24 Mei 2002.

Anggoro, S. 1992. Efek osmotic berbagai tingkat salinitas media terhadap daya tetas telur dan vitalitas larva udang windu [DISERTASI]. Program Pascasarjana, Institut Pertanian Bogor.

Bachere, E., E. Mialhe and J. Rodriguez. 1995. Identification of defence parameters in the haemolymph of crustacean with particular reference to the shrimp *Penaeus japonicas* (Bate), prospects and application. *Fish Shellfish Immunol.* 5:597-612.

Balasubramanian G., Sarathi M., Kumar S.R and Hameed A.S.S. 2007. Screening the antiviral activity of Indian medicinal plants against white spot syndrome virus in shrimp. *Aquaculture* 263:15-19.

Baranano, D.E., Rao, M., Ferris, C.D and Snyder, S.H. 2002. Biliverdin reductase: a major physiologic crytoprotectant. *Proc Natl Acad Sci USA* 99(25):16093-16098.

Baratawidjaja, C. 2004. *Imunologi Dasar*, *edisi 4.* Balai Penerbit Fakultas Kedokteran, Universitas Indonesia, Jakarta.

Basri, N.A., Shaleh, S.R.M., Matanjun, P., Noor, N.M and Shapawi, R. 2015. The potential of microalgae meal as an ingredient in the diets of early juvenile Pcific white shrimp, *Litopenaeus vannamei. App Phyc.*27:857-863.

Bateman, K.S., I. Tew., C. French., R.J. Hicks., P. Martin., J. Munro and G.D. Stentiford. 2012. Susceptibility to infection and pathogenicity of White Spot Disease (WSD) in non-model crustacean host taxa from temperate regions. *Inv Path.* 110:340-351.

Bayne, C.J. 1990. Phagocytosis and non-self recognition in invertebrates phagocytosis appear to be an ancient line of defense. *Bioscience* 40:723-731.

Bell, T.A and D.V. Lightner. 1990. IHHN Disease of *Penaeus stylirostris*, Effects of Shrimp use on Disease Expression. *Fish Dis.* 13: 165-170.

Bower, S.M. 1996. White spot syndrome baculovirus complex of penaeid shrimp. *In:* Synopsis of Infectious Disease and Parasites of Commercially Exploited Shellfish. Fisheries an Oceans Canada. Canada.

Bricknell, I and Dalmo, R.A. 2005.The use of immunostimulants in fish larval aquaculture.*Fish Shellfish Immunol.*19(5): 457-72.

Budiwardhani, R.H. 2018. Analisis Kualitas Air dan Pemberian Imunostimulan Ekstrak Rumput Laut terhadap Perubahan Jumlah Sel Hemosit Udang Vaname *(Litopenaeus vannamei) (Litopenaeus vannamei)* Yang Terinfeksi *White Spot Syndrome Virus* (WSSV) [SKRIPSI]. Program Studi Manajemen Sumberdaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Universitas Brawijaya, Malang.

Campa-Cordova, A.I., N.Y. Hernandez-Saavedra, R. De Philippis and F. Ascencio. 2002. Generation of superoxide anion and SOD activity in haemocytes and muscle of American white shrimp *(Litopenaeus vannamei)* as a response to beta-glucan and sulphated polysaccharide. *Fish Shellfish Immunol.* 12:353-366.

Castex, M., Lemaire, P., Wabete, N and Chim, L. 2010.Effect of probiotic *Pediococcus acidilactici* on antioxidant defences and oxidative stress of *Litopenaeus stylirostris* under *Vibrio nigripulchritudo* challenge.*Fish Shellfish Immunol.* 28(4):622-31.

Chamratchakool, P. 1996. Health Management in Shrimp Ponds. Health Research Institute, Bangkok, Thailand. 50 – 53.

Cerenius, L and K. Soderhall. 2004. The prophenoloxidase-activating system in invertebrate. *Immunological Reviews* 198: 72-82.

Cerenius L., Jiravanchpaisal P., Liu H.P and Soderhall K. 2010. Crustacean immunity. In: Soderhall K, editor. Invertebrate immunity. Lands Bioscience and Springer Science-Business Media pp. 239-59.

Chang, C-F., Su., M-S., Chen, H-Y and Liao, I.C. 2003. Dietary β-1,3-glucan effectively improves immunity and survival of *Penaeus monodon* challenged with white spot syndrome virus. *Fish Shellfish Immunol.* 15: 297-310.

Chang, P.S., L.J. Chen and Y.C. Wang. 1998a. Detection of White spot syndrome associated baculovirus in experimentally infected wild shrimp, crab and lobster by in situ hybridization. *Aquaculture*. 164:233-242.

_____. 1998b. The effect of ultraviolet irradiation, heat, pH, ozone, salinity and chemical desinfectants on the infectivity of White spot syndrome baculovirus. *Aquaculture* 166:1-17.

Chang, Y.S., Liu, W.J., Lee, C.C., Chou, T.L., Lee, Y.T., Wu, T.S., Huang, J.Y., Huang, W.T., Lee., T.L., Kou, G.H., Wang, A.H and Lo, C.F. 2010. A 3D model of the membrane protein complex formed by white spot syndrome virus structural proteins.*PLoS One* 5:e10718.

Charoensapsri, W., Amparyup, P., Suriyachan, C and Tassanakajon, A. 2014. Melanization reaction products of shrimp display antimicrobial properties

against their major bacterial and fungal pathogens. *Dev. Com. Immunol.* 47:150-159.

Chen, L.L., Wang, H.C., Huang, C.J., Peng, S.E., Chen, Y.G., Lin, S.J., Chen, W.Y., Dai, C.F., Yu, H.T., Wang, C.H., Lo, C.F and Kou, G.H. 2002. Transcriptional Analysis of the DNA Polymerase Gene of Shrimp White Spot Syndrome Virus. *Virology* 301(1): 136-147.

Chen, S.N. 1990. *Prawn culture and diseases problems in Taiwan*. Paper presented in Symposium on Diseases Asian Aquaculture Bali. November 26-29, 1990.

Chen, W.Y., Ho, K.C., Leu, J.H., Liu, K.F., Wang, H.C., Kou, G.H and Lo, C.F. 2008. WSSV infection activates STAT in shrimp. *Dev. Comp. Immunol* 32(10): 1142-50.

Chen Y-Y, Chen J-C., Lin Y-C., Putra DF., Kitikiew S., Li C-C., Hsieh J-F., Liou C-H and Yeh S-T. 2014. Shrimp that received carrageenan via immersion and diet exhibit immunocompetence in phagocytosis despite a post-plateu in immune parameter. *Fish Shellfish Immunol* 36:352-366.

Chiu, C.H., Guu. Y.K., Liu, C.H., Pan, T.M and Cheng, W. 2007. Immune responses and gene expression in white shrimp, *(Litopenaeus vannamei)*, induced by *Lactobacillus plantarum. Fish Shellfish Immunol* 23:364-377.

Chou, H-Y., Huang, C.Y., Wang, C.H and Chiang, H.C. 1995.Pathogenicity of a baculovirus infection causing white spot syndrome in cultured penaeid shrimp in Taiwan.*Dis. Aquat. Org.* 23(3): 165-173.

Cloeckaert, A., Vizcarno, N., Paquet, J.Y., Bowden, R.A and Elzer, P.H. 2002. Major outer membrane proteins of *Brucella* spp.: Past, present and future. *Vet.Microb.* 90:229-247.

Crockford, M. 2001. White spot disease, Australian and New Zealand standard diagnostic procedures, 1-16.

Cook, M.T., Hayball, P.J., Hutchinson, W., Nowak, B.F and Hayball, J.D. 2003. Administration of a commercial immunostimulant preparation, EcoActiva as a feed supplement enhances macrophage respiratory burst and the growth rate of snapper *(Pagrus auratus,* Sparidae (Bloch and Schneider) in winter. *Fish Shellfish Immunol.* 14:333-345.

Costa, A.M., Buglione, C.C., Bezerra, F.L., Martins, P.C.C and Barracco, M.A. 2009.Immune assessement of farm-reared *Penaeus vannamei* shrimp naturally infected by IMNV in NE Brazil.*Aquaculture*. 291:141-146.

CSIRO. 2011. *Journal of Marine and Freshwater Research*

Dandapat, J., G.B.N. Chainy and K.J. Rao. 2003. Lipid peroxidation and antioxidant defence status during larval development and metamorphosis

of giant prawn, *Macrobrachium rosenbergii*. *Com. Bioch. Physiol. Part C* 135:221-233.

Darwantin, K., R. Sidik dan G. Mahasri. 2016. Efisiensi Penggunaan Imunostimulan dalam Pakan terhadap Laju Pertumbuhan, Respon Imun dan Kelulushidupan Udang Vannamei *(Litopenaeus vannamei).J. Biosains* 18(2):1-18.

de la Pena, L.D., Lavilla-Pitogo, C.R., Namikoshi, A., Nishizawa, T., Inui, Y and ,Muroga, K. 2003. Mortality in pond-cultured shrimp *Penaeus monodon* in the Philippines associated with *Vibrio harveyi* and White Spot Syndrome Virus (WSSV). *Fish Pathol.*38:59-61.

de la Pena, L.D., Lavilla-Pitogo, C.R., Villar, C.B., Paner, M.G., Sombito, C.D and Capulos, G.C. 2007. Prevalence of white spot syndrome virus (WSSV) in wild shrimp *Penaeus monodon* in the Philippines.*Dis. Aquat. Org.* 77(3): 175-9.

de la Vega., B.M. Degna., M.R. Hall and K.J. Wilson. 2007. Differential expression of immune-related genes and transposable elements in black tiger shrimp *(Penaeus monodon)* exposed to range of environmental stressors. *Fish Shellfish Immunol.* 23(5): 1072-1088.

Di Leonardo, V.A., Bonnichan, V., Roch, P., Parinello, N and Bonami, J.R. 2005. Comparative WSSV infection routes in the shrimp genera *Marsupenaeus* and *Palaemon*. *Fish Dis.* 28: 565-569.

Direktorat Jenderal Perikanan Budidaya. 2016. Laporan Kinerja (LKj). Direktorat Jenderal Perikanan Budidaya Tahun 2015. Kementerian Kelautan dan Perikanan.

Diwan, J.J. 1998. *Membrane Structure and Function* .http://nptel.ac.in/ (22 April 2019).

Durand, S.V., Tang, K.F.J and Lightner, D.V. 2000. Frozen commodity shrimp: Potential avenue for introduction of white spot syndrome virus and yellow head virus. *Aquat. Anim. Health* 12: 128-135.

Durand, S.V. and D.V. Lightner. 2002. Quantitative real time PCR for the measurement of white spot syndrome virus in shrimp. *J. Fish. Dis* 25: 381-389.

Escobedo-Bonilla, C.M *et al*. 2006. Standardized White Spot Syndrome Virus (WSSV) inoculation procedures for intramuscular or oral routes.*Dis. Aquat.Org.* http://www.ncbi.nlm.nih.gov/pubmed/16610583.

Escobodo-Bonilla, C.M. Alday-Sanz, V., Wille, M., Sorgeloos, P., Pensaert, M.B and Nauwynck, H.J. 2008.A review on the morphology, molecular characterization, morphogenesis and phatogenesis of white spot syndrome virus.*Fish Dis.*31(1):1-8.

Fajri, N.A., M. Ali dan S.N. Depamade. 2015. Deteksi WSSV *(White Spot Syndrome Virus)* pada Lobster Air Tawar *(Procambarus clarkii)* Menggunakan Metode Real Time-PCR. *Sains dan Lingkungan* 1(1): 30-36.

Flegel, T.W and Sritunyalucksana, K. 2011. Shrimp molecular responses to viral pathogens. *Mar. Biotechnol.* 13(4):587-607.

Flegel, T.W. 2012.Historic emergence, impact and current status of shrimp in Asia.*Invertebrate Path.* 110: 166-173.

Food and Agriculture Organization (FAO). 1995. *Code of Conduct for Responsible Fisheries*. FAO, Rome, Italy. pp: 41.

_____. 2006. *Livestock Impacts on the Environment, Food and Agriculture Organization of the United Nations, Agriculture and Consumer Protection Department.* http://www.fao.org/ag/magazine/0612sp1.htm(15 Februari 2019).

_____.2012.http://www.fao.org/fishery/culturedspecies/Penaeus_vannamei/en(18April 2019)

_____. 2016. FAO Statistical Yearbook: Fishery andAquaculture Statistics. The organization of Food and Agriculture of the United Nations, Rome.http://www.fao.org. (18 April 2019)

_____. 2017. Increased production of farmed shrimp leads to improved international trade. http://www.fao.org/in-action/globefish/market-reports/resource-detail/en/c/989543.(15 Februari 2019).

Food and Agriculture Organization of the United Nations Globefish (FAO Globefish).2015. http://www.globefish.org/.(15 Februari 2019).

Gannam, A.L and Sehrock, R.M. 2001.*Immunostimulant in fish diet.*In Lim C.Webster CD. (Ed) *Nutrition and Fish Health* . Food Products Press, New York. P:235-260.

Gao, H., Li, F., Dong, B., Zhang, Q and Xiang, J. 2009. Molecular cloning and characterization of prophenoloxidase (proPO) Cdna from *Fenneropenaeus chinensis* and its transcription injected by *Vibrio anguillarum. Mol. Biol. Report.* 39:1159-66.

Giri, S.S., Chi, C., Jun, J.W and Park, S.C. 2016.Use of bacterial subcellular components as immunostimulants in fish aquaculture.*Reviews in Aquaculture* 0:1-19.

Giulianini, P.G., M. Bierti., S. Lorenzon., S. Battistella and E.A. Ferrero. 2007. Ultrastructural and functional characterization of circulating hemocytes from the freshwater crayfish *Astacus leptodactylus*: Cell types and their role after in vivo artificial non-self challenge. *Micron* 38:49-57.

Gustrifandi, H. 2013. Prevalensi *Zoothamnium penaei*, Respon Imun dan Kelulushidupan pada Udang Vaname *(Litopenaeus vannamei)* di Tambak yang Diimunisasi dengan Protein Membran Imunogenik *Zoothamnium penaei* [THESIS].Program Pascasarjana Universitas Airlangga Surabaya.

Haliman, R.W dan Adijaya, D. 2005.*Udang Vannamei*. Penebar Swadaya. Jakarta. Hal: 74.

Hameed, A.S.S., Anikumar, M., Raj, M.L and Jayaraman, K. 1998.Studies on the pathogenicity of systemic ectodermal and mesodermal baculovirus (SEMBV) and its detection in shrimps by immunological methods.*Aquaculture* 160:31-45.

Hameed, A.S.S., Balasubramanian, G., Musthaq, S.S and Yoganandhan, K. 2004. Experimental infection of twenty species of Indian marine crabs with white spot syndrome virus (WSSV).*Dis. Aquat. Org.*57(1-2):157-61.

Harijanto.2012. Kemampuan Imunostimulan dari Protein Membran Imunogenik *Zoothamnium penaei* untuk Menekan Zoothamniosis pada Udang Vannamei *(Litopenaeus vannamei)* [THESIS]. Program Pascasarjana, Universitas Airlangga, Surabaya.

Hariati, S. 2017. Efektivitas Metabolit *Nodulisporium* sp. KT29 Pada Kinerja Produksi dan Respons Imun Udang Vaname Yang Dibudidayakan Di Laut Terhadap Ko-Infeksi WSSV dan *Vibrio harveyi*. [TESIS]. Institut Pertanian Bogor. Bogor

Homvises, T., Tassanakajon, A and Somboonwiwat, K. *Penaeus monodon* SERPIN *Pm*SERPIN6, is implicated in the shrimp innate immunity. *Fish Shellfish Immunol.* 29:800-8.

Huang, J., X.L. Song., J. Yu and C.H. Yong. 1995. Baculovirus hypodermal and haematopoetic necrosis, study on the pathogen and pathology of the shrimp explosive epidemic disease of shrimo. *Mar. Fish. Res* 16: 1-10.

Huang, C., Zhang, L., Zhang, J., Xiao, L., Wu, Q., Chen, D and Li, J.K. 2001. Purification and characterization of White Spot Syndrome Virus (WSSV) produced in an alternate host: crayfish, *Cambarus clarkia*. *Vir. Res.* 76(2): 115-25.

Huang, P.Y., Leu, J.H and Chen, L.L. 2014.A newly identified protein complex that mediates white spot syndrome virus infection via chitin-binding protein.*Gen Virol.* 95: 1799-1808.

Huang, R., Xie, Y., Zhang, J and Shi, Z. 2005. A Novel Envelope Protein Involved in White Spot Syndrome Virus Infection.*Gen. Virol.*86(1): 1357-61.

Huang, X., Feng, J.L., Jin, M., Ren, Q and Wang, W. 2016. C-type lectin *(MrCTL)* from the giant freshwater prawn *Macrobrachium rosenbergii* participates in innate immunity. *Fish Shellfish Immunol.* 58: 136-144.

Huang, Y.C., Yin, Z.X., Ai, H.S., Huang, X.D., Li, S.D., Weng, S.P and He, S.P. 2011.Characterization of WSSV resistance in selected families of *Litopenaeus vannamei*. *Aquaculture* 311: 54-60.

Icely, J.D. and Nott, J.A. 1992. Digestion and absorption: digestive system and associated organs. In-*Microscopic Anatomy of Invertebrates:Decapod, Crustacea.* Vol. 10, eds. F.W. Harrison and A.G. Humes. Wily-Liss Inc.,New York, pp 147-201.

Inouye, K., S. Miwa., N. Oseko., H, Nakano., T. Kimura., K. Momoyama and M. Hiraoka. 1994. Mass mortalities of cultured kuruma shrimp *Penaeus japonicas* in Japan in 1993. Electron microscope evidence of the causative virus.*Fish.Pathol.* 29:149-158.

Itabashi, T., Mikami, K and Asai, H. 2003.Characterization of the spasmin I gene in *Zoothamnium arbuscula* strain Kawagoe (protozoa eiliophora) and its relation to other spasmins and centris.*Res. Microbiol.*154(5):361-367.

Janeway, Jr.C.A and Medzhitov, R. 2002. Innate immune recognition.*Annu. Rev. Immunol* 20:197-216.

Jasmanindar, Y. 2019. Evaluasi Pemanfaatan Ekstrak *Gracillaria verrucosa* Terhadap Sistem Imun dan Pertumbuhan Udang Vaname *(Litopenaeus vannamei).* [DISERTASI]. Institut Pertanian Bogor. Bogor.

Jeeves, M and Knowles, T.J. 2015.A novel pathway for outer membrane protein biogenesis in Gram-negative bacteria.*Mol. Microbiol.* 97:185-187.

Jiravanichpaisal, P., Puanglarp, N., Petkon, S., Donnuea, S., Soderhall, I and Soderhall, K. 2007.Expression of immune-related genes in larval stages of giant tiger shrimp *Penaeus monodon.Fish Shellfish Immunol.* 23:815-24.

Johansson, M.W., P. Keyser., K. Sritunyalucksana and K. Soderhall. 2000. Crustacean haemocytes and haemotopoesis. *Aquaculture* 191:45-52.

Johansson, M.W. and Soderhall, K. 1989. Celluler Immunity in Crustacean and the Pro System. *Parasitology Today* 5(6):171-176.

Ju, Z.Y., Deng, D-Y and Dominy, W. 2012.A defatted microalgae *(Haematococcus pluvialis)* meal as a protein ingredient to partially replace fishmeal in diets of Pacific white shrimp *(Litopenaeus vannamei,* Boone, 1931).*Aquaculture* 354-355:50-55.

Kadarmila, S. 2012. Udang Asal Cilacap Ditolak Ekspor ke Jepang. Detik Finance. Oktober.

Kanost, M and Gorman, M.J. 2008.*Phenoloxidases in Insect ImmunityIn Book*: Insect Immunology, pp: 69-iv. https://www.researchgate.net/publication/280204224_Phenoloxidases_in_Insect_Immunity (18 Februari 2019).

Kementerian Kelautan dan Perikanan (KKP) Direktorat Kesehatan Ikan dan Lingkungan Direktorat Jenderal Perikanan Budidaya. 2014. *Buku Saku Pengendalian Hama dan Penyakit Ikan*. Jakarta

Kementerian Kelautan dan Perikanan (KKP). 2015. *Analisis Data Pokok Kelautan dan Perikanan*. Jakarta (ID): KKP Press.

Kilawati, Y., Maimunah, Y dan Ekawati, A.W. 2014. *Populasi dan Karakteristik Genetik Udang yang Terkena Dampak Pencemaran di Perairan Jawa Timur.*

Kitikiew, S., Chen J-C., Putra D.F., Lin Y-C., Yeh S-T and Liou C-H. 2013. Fucoidan effectively provokes the innate immunity of white shrimp *(Litopenaeus vannamei)* and its resistance against experimental *Vibrio alginolyticus* infection. *Fish Shellfish Immunol* 34:280-290.

Koebnik, R., Locher, K.P and van Gelder, P. 2000. Structure and function of bacterial outer membrane proteins: barrels in a nutshell. *Mol. Microbiol.* 37:239-253.

Kordi, M.G. 2007.*Pemeliharaan Udang Vannamei.* Surabaya: Penerbit Indah.

Kuyama, H., Masuda, T., Nakajima, C., Momoji, K., Sugawara, T., Nishimura, O., and Hirata, T. 2013. Mass spectrometry based N- and C-terminal sequence determination of a hepatopancreas-type prophenoloxidase from the kuruma prawn, *Marsupenaeus japonicas. Anal.Bioanal. Chem.* 405: 2333-2340.

Kwang, L.C. 1996. *Immune Enhancer in the Control of Disease in Aquaculture*.Encap Technology Pte Ltd 14. Besut Street, Jurong Town, Singapore. P. 99-128.

Le Moullac, G., C. Soyez., D. Saulnier., D. Ansquer., J.C. Avarre and P.Levy. 1998. Effect of hypoxic stress on the immune response and the resistance to vibriosis of the shrimp *Penaeus stylirostris*. *Fish Shellfish Immunol*. 8:621-629.

Leu *et al*. 2009. Morphology of WSSV *In:* Tuan, V.V. 2016. *Antibacterial and antiviral activity of different haemocyte subpopulations of Litopenaeus vannamei* [DISSERTATION].Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium.

Li, D.F., Zhang, M.C., Yang, H.J.,Zhu, Y.B and Xu, X. 2007. Beta-integrin mediates WSSV Infection. *Virol.* 368(1): 122-32.

Li, X., Gong, X., Zhang, L., Jiang, R., Li, H.Z., Wu, M.J and Wan, J.Y. 2013.Protective effects of polydatin on septic lung injury in mice via upregulation of HO-1.*Mediat Inflamm* 354087.

Li, Z., Li, F., Han, Y., Xu, L and Yang, F. VP24 is a Chitin-Binding Protein Involved in White Spot Syndrome Virus Infection. *Virol.*90(2): 842-850.

Li, Z., Xu, L., Li, F., Zhou, Q and Yang, F. 2011. Analysis of white spot syndrome virus envelope complexome by two-dimensional blue native/SDS-PAGE combined with mass spectrometry. *Arch. Virol* 156: 1125-1135.

Lightner, D.V. 2011. Virus diseases of farmed shrimp in the Western Hemisphere (the Americas): A review. *Invert.Pathol*. 106:110-130.

Lin, C.Y., K.Y. Hu., S.H. Ho and Y.L. Song. 2006. Cloning and characterization of a shrimp clip domain serine protease hmolog (c-SPH) as a cell adhesion molecule. *Dev. Com. Immunol.* 30:1132-1144.

Lin, Y., Xu. L and Yang, F. 2010. Tetramerizationof white spot syndrome virus envelope protein VP33 and its interaction with VP24.*Arch. Virol.* 155:833-838.

Lin, Y-S., Yeh, S.C., Li, C-C., Chen,L-L., Cheng, A.N and Chen, J. 2011. An immersion of *Gracilaria tenuistipitata* extract improves the immunity and survival of white shrimp *Litopenaues vannamei* challenged with white spot syndrome virus. *Fish Shellfish Immunol.* 31(6):1239-46.

Lin, Y.C., Chen, J.C., Li, .C.C., Mori, W.Z., Suhaili, A.S., Kuo, Y.H, *et al*. 2012. Modulation of the innate immune system in white shrimp *Litopenaeus vannamei* following long-term low salinity exposure. *Fish Shellfish Immunol* 33:324-31.

Lin Y-C., Chen J-C., Morni WZW., Putra D.F., Huang C-L., Li C-C and Hsieh, J.F. 2013. Vaccination enhances early immune responses in white shrimp *(Litopenaeus vannamei)* after exposure to *Vibrio alginolyticus. PloS ONE* 8(7):1-7.

Liu, C.H and Chen, J.C. 2004.Effect of ammonia on the immune response of white shrimp *Litopenaeus vannamei* and its susceptibility to *Vibrio alginolyticus.Fish Shellfish Immunol.* 16:321-334.

Livak, K.J and , T.D. Schmittgen. 2001. Analysis of relative gene expression data using real-time quantitative PCR and the 2(-Delta Delta C(T)) Method. *Methods* 25(4):402-8.

Soeharsono. 1998. Belajar dari kasus merebaknya SEMBV. *Majalah Mitra Bahari* 2:28.

Schmittgen, T.D. and K.J. Livak. 2008. Analyzing real-time PCR data by comparative C_T method. *Nature Protocols* 3(6): 1101-1108.

Lo, C.F., C.H. Ho., C.H. Chen., K.F. Liu., Y.L. Chiu., P.Y. Yeh., S.E. Peng., H.C. Hsu., H.C. Liu., C.F. Chang., M.S. Su., C.H. Wang and G.H. Kou. 1997. Detection and tissue tropism of White spot syndrome Baculovirus (WSBV) in captured brooders of *Penaeus monodon* with a special emphasis on reproductive organs. *Dis. Aquat. Org.* 30:53-72.

Luo, Z., Fu, J.P., Liu, Z.X., Qin, T., Zhang, X.L and Nie, P. 2016. Immunogenic proteins and their vaccine development potential evaluation in outer membrane proteins (OMPs) of *Flavobacterium columnare.Aquac.Fish.* 1: 1-8.

Ma, J., Zeng, L and Lu, Y. 2017. Penaeid shrimp cell culture and its applications. *Rev. Aquac.* 9: 88-89.

Ma, K.Y., T.Y. Chan and K.H. Chu. 2011. Refuting the six-genus classification of Penaeus *(Dendrobranchiata, Penaeidae)*: A combined analysis of mitochondrial and nuclear genes. *Zoologica Scripta* 50: 498-508.

Magbanua, F.O., Natividad, K.T., Migo, V.P., Alfafara, C.G and 6 others. 2000. White spot syndrome virus (WSSV) in cultured *Penaeus monodon* in the Philippines. *Dis. Aquat. Org.*42:77-82.

Mahardika, K., Zafran dan I. Koesharyani. 2004. Deteksi *White Spot Syndrome Virus* (WSSV) Pada Udang Windu *(Penaeus monodon)* di Bali dan Jawa Timur Menggunakan Metode *Polymerase Chain Reaction* (PCR). *Penelitian Perikanan Indonesia* 10: 55-60.

Mahasri, G. 1996. Pengaruh manipulasi tingkat aerasi dan padat tebar terhadap infestasi parasit protozoa kelas ciliate pada benur udang windu [TESIS].Institut Pertanian Bogor.

_____. 1997. Infestasi Parasit Protozoa kelas Ciliata pada Benur Udang Windu *(Penaeus monodon* Fab.) pada Tingkat Aerasi dan Padat Tebar yang Berbeda.*Media Kedokteran Hewan.*Vol. 13, 1: 73-79.

_____. 1998. Hubungan infestasi ciliata patogen dengan tingkat kematian benih udang windu *(Penaeus monodon* Fab.). *Media Kedokteran Hewan*.Vol. 14, No. 6.

_____. 1999. Desain Petak Resirkulasi sebagai Upaya Meningkatkan Hasil Panen Udang Windu. Fakultas Kedokteran Hewan, Unair, Surabaya.

_____. 2007. Protein Membran Imunogenik *Zoothamnium penaei* Sebagai Bahan Pengembangan Imunostimulan pada Udang Windu *(Penaeus monodon* Fabricus) Terhadap *Zoothamniosis* [DISERTASI]. Program Pascasarjana Universitas Airlangga Surabaya.

Mahasri, G., Kusdarwati, R., Kismiyati, Rozi and Gustrifandi, H. 2018. Effectivity of immunostimulant from *Zoothamnium penaei* protein membrane for decreasing the mortality rate of white shrimp *(Litopenaeus vannamei)* in traditional plus pond.*IOP Conference Series: Earth and Enviromental Science* Vol: 137.

Maimunah, Y. 2016. Ekspresi Enzim Ribonucleotide Reductase pada Post Larva Udang Vannamei *(Penaeus vannamei)* yang Terinfeksi *White Spot Syndrome Virus* (WSSV) [DISERTASI].Program Studi Doktoral

Matematika dan Ilmu Pengetahuan Alam, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.

Manik, R dan K. Mintardjo. 1990. Dalam : Pedoman pembenihan Udang Penaeid. Direktorat Jenderal Perikanan. Departemen Pertanian. Jakarta. Hal: 117-124.

Manoppo, H. 2011. Peran Nukleotida Sebagai Imunostimulan Terhadap Respon Imun Nonspesifik dan Resistensi Udang Vaname *(Litopenaeus vannamei)* [DISERTASI]. Sekolah Pascasarjana, Institut Pertanian Bogor, Bogor.

Martin, G.G and L.B. Graves. 1990. Fine Structure and Classification of Shrimp Haemocytes. *Morphology* 185:339-348.

Martin, G.G. and Chiu, A. Morphology of the midgut trunk in the penaeid shrimp,*Sicyonia ingentis*, highlighting novel nuclear pore particles and fixed hemocytes. *Morphology* 258(2): 239-48.

Martin, J.W and G.E. Davis. 2001. An updated classification of the recent crustacean science series number 39. *Natural History Museum of Los Angeles Country*, Los Angeles, pp: 124.

Mayo, M.A. 2002. A summary of taxonomic changes recently approved by ICTV.*Arch Virol.* 147(8): 1655-1656.

McColl, K., Slater, J., Jeyasekaran, G., Hyatt, A and Crane, M.S. 2004. Detection of white spot syndrome virus and yellow head virus in prawns imported into Australia.*Australia Veterinary* 82:69-74.

McLaughlin, P.A. 1983. *Internal anatomy*. In: Mantel, I.H. (Eds), the biology of crustacean, volume5. Internal anatomy and physiological regulation, Academic press, New York and London, pp: 1-52.

Mohan, C.V., P.M. Sudha., K.M. Shankar and A. Hegde. 1997. Vertical transmission of White spot baculovirus in shrimp a possibility? *Cur. Sci*. 73:109-110.

Mohankumar, K and Ramasamy, P. 2006. White spot syndrome virus infection decreases the activity of antioxidant enzymes in *Fenneropenaeus indicus. Vir. Res.* 115(1):69-75.

Momoyama, K., M. Hiroke., H. Nakano., H. Koube., K. Inouye and N. Oseka. 1994. Mass mortalities of cultured kuruma shrimp *Penaeus japonicas* in Japan in 1993: Histopathological study. *Fish Path.* 29:141-48.

Nakano, H., H. Koube., S. Umezawa., K. Momoyama., M. Hiroaka., K. Inouye and N. Oseka. 1994. Mass mortalities of cultured kuruma shrimp *Penaeus japonicas* in Japan in 1993: Epizootiological survey and infection trials. *Fish Pathol.* 29:135-139.

Namikoshi, A., Wu, J.L., Yamashita, T., Nishizawa, T., Nishioka, T., Arimoto, M and Muroga, K. 2004.Vaccination trials with *Penaeus japonicas* to induce resistance to white spot syndrome virus.*Aquaculture* 229: 25-35.

Nash, G.L., Anutara and W. Boonsirm. 1993. Rapid Diagnosis of Yellow Head Disease in Black Tiger Shrimp Culture Research Centre. AHHRI NEWSLETTER, July 1993. Choroen Phokphand Feedmil Co.Ltd, Smuth Sakorn. Thailand. Pp:87.

Nolan, T., R.E. Hands and S.A. Bustin. 2006. Quantification of mRNA using real-time RT-PCR. *Nature Protocols* 1(3):1559-1582.

OIE. 2009. *Manual Diagnostic Tests for Aquatic Animals:* White spot disease. Office International des Epizooties, Paris, Chapter 2.2.5, 121-131.

OIE. 2018. Chapter 2.2.8 :*Infection with White Spot Syndrome Virus*. *Manual of Diagnostic Test for Aquatic Animals*.

Otterbein, L.E., Bach, F.H., Alam, J., Soarez, M., Tao Lu, H., Wysk, M., Davis, R.J., Flavell, R.A and Choi, A.M. 2000. Carbon monoxide has anti-inflammatory effects involving the mitogen-activated protein kinase pathway. *Nat Med* 6(4):422-428.

Owens, L and O'Neill, A. 1997. Use of clinical cell flow cytometry for differential counts of prawn *(Penaeus monodon)* haemocytes. *Dis. Aquat. Org.* 31:147-153.

Pais, R., Khushiramani, R., Karunasagar, I and Karunasagar, I. 2008. Effects of immunostimulant on the haemolymph haemagglutinins of tiger shrimp *Penaeus monodon .Aquac.Res.*39(12).

Panjaitan, A.S. 2012. Pemeliharaan Larva Udang Vaname *(Litopenaeus vannamei, Boone 1931)* Dengan Pemberian Jenis Fitoplankton Yang Berbeda [THESIS]. Program Pascasarjana Universitas Terbuka, Jakarta.

Pasongli,H.G.D. Dirawan dan Suprapta. 2015. Zonasi Kesesuaian Tambak untuk Pengembangan Budidaya Udang Vannamei *(Penaeus vannamei)* pada Aspek Kualitas Air di Desa Todowongi Kecamatan Jailolo Kabupaten Halmahera Barat.*Bioedukasi* 3(2): 324-335.

Pedrosa-Gerasmio, I.R., Tanaka, T., Sumi., A., Kondo, H and Hirono, I. 2018. Effects of 5-Aminolevulinic Acid on Gene Expression, Immunity and ATP Levels in Pacific White Shrimp, *Litopenaeus vannamei*. *Mar. Biotechnol.*Volume Issue 2018.

Peng, B., Ye, J-Z., Han, Y., Zeng, L., Zhang, J-Y and Li, H. 2016.Identification of polyvalent protective immunogens from outer membrane proteins in *Vibrio parahaemolyticus* to protect fish against bacterial infection.*Fish Shellfish Immunol.* 54:204-210.

Peraturan Menteri Kelautan dan Perikanan Republik Indonesia Nomor 75/PERMEN-KP/2016 tentang Pedoman Umum Pembesaran Udang Windu *(Penaeus monodon)* dan Udang Vaname *(Litopenaeus vannamei)*.Sekretaris Negara Republik Indonesia. Hal: 1-30.

Perez-Ferfante,I and B. Kenslev. 1997. Penaeoid and sergestoid shrimps and prawns of the world: Keys and diagnoses for the families and genera, *Volume 175,* Paris, France, pp: 10-55.

Person, M., Cerenius, L and Soderhall, K. 1987. The Influence of Haemocyte Number on the Resistance of the Freshwater Crayfish *Pacifastacus leniculus* Dana, to the Parasitic Fungus *Aphanomyces astaci*. *Fish Disease J* 10:471-477.

Poulos, B.T., C.R. Pantoja., D.B. Dunlop., J. Aguilar and D.V. Lightner. 2001. Development and application of monoclonal antibodies for detection of White spot syndrome virus of penaeid shrimp. *Dis. Aquat. Org* 47: 13-23.

Prastiti, L.A. 2017. Efektivitas Mannan Oligosakarida untuk Peningkatan Repons Imun Udang Vaname *Litopenaeus vannamei* Terhadap Infeksi *White Spot Disease* [TESIS]. Sekolah Pascasarjana, Institut Pertanian Bogor, Bogor.

Raa, J. 2000. The use of imunostimulants in fish and shellfish feeds. *In:* L.E. Cruz-Suarez., D. Richie-Marie., M. Tapia-Salazar., M.A. Olvera-Novoa and R. Civera-Ceredo (Eds). Avences en Nutricion Acuicola V. Memories del V. Symposium Internacionale de Nutricion Acuicola, Merid, Yucatan, Mexico.47-54.

Rahardianti, R dan Nur, E.M. 2017.Akurasi Metode Real PCR Untuk Analisa Ekspresi Gen *PmVRP15* disampaikan dalam *Prosiding Pertemuan Teknis Teknisi Litkayasa Lingkup BBPBAP Jepara* 2017. Balai Besar Perikanan Budidaya Air Payau Jepara, Jawa Tengah.

Rahman, M and Kawai, K. 2000. Outer membrane protein of *Aeromonas hydrophila* induce protective immunity in goldfish. *Fish Shellfish Immunol.* 10:379-382.

Rajendran, K.V., Vijayan, K.K., Santiago, T.C and Krol, R.M. 2001. Experimental host range and histopathology of white spot syndrome virus (WSSV) infection in shrimps, prawns, crabs and lobsters from India. *Fish Dis.* 22: 183-191.

Ramadhan, A. 2017.Penggunaan Ekstrak Batang Pisang Ambon Lumut Sebagai Imunostimulan Untuk Pencegahan Penyakit *White Spot* Pada Udang Vaname [THESIS]. Sekolah Pascasarjana, Institut Pertanian Bogor, Bogor.

Reddy, A.D., Jyasekaran, G and Shakila, R.J. 2010. Incidence of white spot syndrome virus (WSSV) in Indian farmed frozen shrimp products and

testing for viability through bio-inoculation studies. *Aquat.Res. Dev.* 1(1-5):102

Roballino, J., Browdy, C.L., Prior, S., Metz, A., Parnell, P., Gross, P and Warr, G. 2004.Induction of antiviral immunity by double-stranded RNA in a marine invertebrate.*Virol.* 78:10442-10448.

Roch, P. 1999. Defence mechanisms and disease prevention in farmed marine invertebrates. *Aquaculture.* 172:125-145.

Rodriguez, J and G. Le Moullac. 2000. State of the art of immunological tools and health control of penaeid shrimp. *Aquaculture* 191:109-119.

Roitt, I., Brostoff, J and Male, D. 1998. *Immunology 4th Ed.* Barcelona, Spain, Mosby, Times Mirror International Publisher Limited.

Rouledge, L.M. 1978. Calcium-binding proteins in the Vorticellid spasmoneme: Extraction and Characterization by Gel Electrophoresis. *Cell Biol.* 77:358-370.

Rukyani, A. 1996. Jenis Penyakit Udang di Tambak dan Cara Pengendaliannya, di: Makalah Pertemuan Aplikasi Paket Teknologi Pertanian, Tanggal 9 – 11 Januari di BIP. Lampung.

Ruppert, E.E. and R.D. Barnes. 1994. *Invertebrate Zoology*, Sixth Edition, Saunders College Publishing. Tokyo.

Sakai, M. 1999. Current research status of fish immunostimulants.*Aquaculture* 172(1-2): 63-92.

Sánchez-Martinez, J.G., Aguirre-Guzmán, G and Mejia-Ruiz, H. 2007. White Spot Syndrome Virus in cultured shrimp: A review. *Aquac. Res.* 38(13): 1339-1354.

Sánchez-Paz, A. 2010. White spot syndrome virus: an overview on an emergent concern. *Vet. Res.* 41(6): 43.

Sánchez-Paz,A. 2010. White spot syndrome virus: an overview on an emergent concern. *Vet. Res.* 41(6): 43.

Sangamaheswaran, A.P and M.J.P. Jeyaseelan. 2001. A Review: White spot viral disease in penaeid shrimp. *The ICLARM Quarterly*, Naga 24:18.

Saputra, F., Wahjuningrum, D., Tarman, K dan Effendi, I. 2016.Pemanfaatan metabolit jamur laut *Nodulisporium* sp. KT29 untuk meningkatkan kinerja produksi budidaya udang vaname di laut.*Ilmu dan Teknologi Kelautan Tropis* 8: 747-755.

Sealey, W.M and Gatlin III, D.M. 2001.*Overview of nutritional strategies affecting the health of marine fish diacu* dalam Nutrition and Fish Health. Food Products Press, New York. Pp: 103-112.

Secombes, C.J. 1996. *The Nonspecific Immune System: Cellular Defenses, In The Fish Immune System: Organism, Pathogen and Environment,* Iwama, G and Nakanishi, T. Academic Press. San Diegpo, USA. Pp. 63-103.

Selvin, J and Lipton, A.P. 2003. *Vibrio alginolyticus* associated with white spot disease of *Penaeus monodon*. *Dis.Aquat. Org.* 57: 147-150.

Setyawan, A. 2019. Fucoidan dari Alga Cokelat Tropis Sebagai Imunostimulan Udang Vannamei *(Litopenaeus vannamei)*: Kajian Hematologi, Ekspresi Gen-gen Imun, Resistensi Terhadap WSSV dan Pertumbuhan. [DISERTASI]. Universitas Gadjah Mada. Yogyakarta.

Smith, V.J., Brown, J.H and Hauton, C. 2003. Immunostimulation in crustacean: does it really against infection?. *Fish and Shellfish Immunol*. 15: 71-90.

Soderhall, K and Cerenius, L. 1992. Crustacean immunity.*Ann. Rev.Fish Dis.* 3-23.

_____. 1998. Role of the prophenoloxydase activating system in invertebrates immunity. *Current Opinion.Immunol.* 10:23-28.

_____. 1998. Role of prophenoloxydase-activating system in invertebrate immunity. *Current Opinion.Immunol.* 10:23-28.

Soetomo, M.H.A. 2000.*Teknik Budidaya Udang Windu*. Sinar Baru Algesindo.Bandung.

Soetrisno, C.K. 2004. Mensiasati penyakit WSSV di tambak. *Aquaculture Indonesia*. 5:19-31.

Song, Y and Li, C. 2014. Shrimp immune system-special focus on penaeidin. *Journal Marine Science and Technology* 22: 1-8.

Sritunyalucksana, K and K. Soderhall. 2000. The proPO and clotting system in crustaceans. *Aquaculture* 191:53-69.

Stentiford, G.D., Bonami, J-R. and Alday-Sanz, V. 2009. A critical review of susceptibility of crustaceans to Taura syndrome, Yellowhead disease and White Spot Disease and implications of inclusion of these diseases in European legislation.*Aquaculture* 291: 1-17.

Subaidah, S., Susetyo, P., Mizab, A.T.I.N., Gede, S., Petrich, N dan Sri, C. 2006. Pembenihan Udang Vannamei *(Litopenaeus vannamei).* Departemen Kelautan dan Perikanan Direktorat Jenderal Perikanan Budidaya Air Payau.Situbondo.

Sumawidjaja, K. 1991. Penyakit Benih Udang Windu *(Penaeus monodon* Fabricus), Makalah Seminar Hasil-hasil Penelitian. Institut Pertanian Bogor, 7 April.

Sun, J., Wang, L., Wang, B., Guo, Z., Liu, M., Jiang, K and Luo, Z. 2007.Purification and characterization of a natural lectin from the serum of the shrimp *Litopenaeus vannamei*.*Fish Shellfish Immunol.* 23:292-299.

Supranto, J. 2000. *Teknik Sampling untuk Survei & Eksperimen.*Penerbit Rineka Cipta.

Suprapto, H. 2002. Penularan *White spot baculovirus* (WSBV) secara buatan pada udang windu, *Penaeus monodon*. Fab.*Habitat* 13: 270-273.

Sutthangkul, J., Amparyup, P., Charoensapsri, W., Senapin, S., Phiwsaiya, K and Tassanakajon, A. 2015.Suppression of shrimp melanization during white spot syndrome virus infection.*Biol. Chem.* 290:6470-6481.

Takahashi, Y., T. Itami., M. Kondo., M. Maeda., R. Fujii., S. Tomonaga., K. Supamattaya and S. Boonyaratpalin. 1994. Electron microscopic evidence of bacilliform virus infection in kuruma shrimp *(Penaeus japonicas) .Fish Pathol.*29:121-125.

Tassanakajon, A., Somboonwiwat, K., Supungul, P and Tang, S., Discovery of immune molecules and their crucial functions in shrimp immunity.*Fish Shellfish Immunol.* 34: 954-967.

Taw, N. 2005.*Indonesia Shrimp Production*.Presented in the Indonesian shrimp farmers session of World Aquaculture 2005, 9-13 May 2005, Nusa Dua, Bali, Indonesia. Charoen Pokphand, Jakarta Indonesia pp: 18.

Tizard, I.R. 1988. *Pengantar Imunologi Veteriner*, (Terjemahan). Airlangga University Press, Surabaya.

Tricahyo. 1995. *Biologi dan kultur udang windu.* Akademika Pressindo, Jakarta. Hal: 50-52.

Tsai, J.M., Wang, H.C., Leu, J.H., Hsiao, H.H., Wang, A.H., Kou, G.H and Lo, C.F. 2004.Genomic and proteomic analysis of thirty-nine structural proteins of shrimp white spot syndrome virus.*Virol.* 78(20): 11360-70.

Tsiftsoglou, A.S., Tsamadou, A.I and Papadopoulou, L.C. 2006. Heme as key regulator of major mammalian cellular functions: molecular, sellular and pharmacological aspects. *Pharmacol Ther* 111(2):327-345.

Utari, H.B. 2018.Selain kawasan petambak, pencegahan penyakit tanpa penggunaan bahan kimia juga berperan penting.Majalah TROBOS Aqua Ed. 79/15 Desember 2018- 14 Januari 2019.

van de Braak, K. 2000. Haemocytic defence in black tiger shrimp *(Penaeus monodon)* [DISERTATION].van Wareningen Universiteit, Germany.

Vargas-Albores, F and Yepiz-Plascencia, G. 2000.Beta glucan binding protein and its role in shrimp immune response.*Aquaculture.* 191:13-21.

Vargas-Albores, F., Jimenez-Vega, F and Soderhall, K.A. 1996. A plasma protein isolated from brown shrimp *(Penaeus californiensis)* which enhances the activation of prophenoloxydase system by beta-1,3-glucan. *Dev. Com. Immunol*. 20:299-306.

Vasta, G.R., Ahmed, H., Tasumi, S., Odom, E.W and Saito, K. 2007. Biological roles of lectins in innate immunity: molecular and structural basis for diversity in self/non-self recognition.*Advan. Exp. Med. Biol.* 598:389-406.

Vazquez, L., J. Alpuche., G. Maldonado., C. Agundis., A. Pereyra-Morales and E. Zenteno. 2009. Review: Immunity mechanisms in crustaceans. *Innate Immun.* 15:179-188.

Wang, C.H. C.F. Lo., J.H. Leu., C.M. Chou., P.Y. Yeh., H.Y. Chou., M.C. Tung., C.F. Chang., M.C. Su and G.H. Kou.1995. Purification and genomic analysis of baculovirus associated with White spot baculovirus (WSBV) of *Penaeus monodon. Dis. Aquat. Org.* 23:239-242.

Wang, C.S., K.F.J, Tang., G.H. Kou and S.N. Chen. 1997. Light and electron microscopic evidence of White Spot Baculovirus (WSBV) of *Penaeus monodon*. *Dis. Aquat. Org.* 23:239-242.

Wang, C.S., K.F.J. Tang., G.H. Kou and S.N. Chen. 1997a. Light and Electron Microscopic Evidence of White Spot Disease in the Giant Tiger Shrimp, *Penaeus monodon* (Fabricus), and the Kuruma Shrimp, *Penaeus japonicas* (bate), Cultured in Taiwan. *Fish Dis.* 20:323-331.

Wang, Y.G., Lee, K.L., Najiah, M., Shariff, M and Hassan, M.D. 2000. A new bacterial white spot syndrome (BWSS) in cultured tiger shrimp *Penaeus monodon* and its comparison with white spot syndrome (WSS) caused virus. *Dis.Aquat. Org.* 41:9-18.

Wang, X.W and Wang, J.X. 2012.Diversity and multiple functions of lectins in shrimp immunity.*Dev. Com. Immunol.* 39(1-2): 27-38.

Wang, Y.C., Chang, P.S and Chen, H.Y. 2007.Tissue expressions of nine genes important to immune defence of Pacific white shrimp *Litopenaeus vannamei*.*Fish Shellfish Immunol.* 23:1161-1177.

Welker, T., C. Lim., M. Yildirim-Aksoy., R. Shelby and P.H. Klesius. 2007. Immune response and resistance to stress and *Edwardsiella ictaluri* challenge in channel catfish, *Ictalurus punctatus*, fed diets containing commercial whole-cell yeast or yeast subcomponents. *World Aquac.Soc.* 38(1):24-35.

Wheatley, M.G. 1999. Calcium homeostasis in Crustacea: the evolving role of branchial, renal digestive and hypodermal epithelia. *Exp. Zool*283: 620-640.

Witteveldt, J., Cifuentes, C.C., Vlak, J.M and van Hulten, M.C.W. 2004.Protection of *Penaeus monodon* against White Spot Syndrome Virus by Oral Vaccination.*Virol.* 78(4): 2057-2061.

Wiradana, P.A., G. Mahasri., R.E.R. Sari., U.C. Marwiyah and R. Prihadhana. 2019. Identification of white spot syndrome virus (WSSV) in pacific white shrimps *(Litopenaeus vannamei)* from ponds postexposure to immunogenic membrane proteins *(Zoothamnium penaei). IOP Conf. Series. : Earth and Enviromental Science*. 236/1/012085.

Wongteerasupaya, C., J.E. Vickers., S. Sriurairatana., G.L. Nash., A. Akarajamorn., V. Boonsaeng., S. Panyim., A. Tassanakajon., B. Withyachumnarnkul and T.W. Flegel. 1995. A non-occluded, systemic baculovirus that occurns in the cells of ectodermal and mesodermal origin and causes high mortality in black tiger prawn, *Penaeus monodon*. *Dis. Aquat. Org.* 21:69-77.

Wongprasert K., Rudtanatip T and Praiboon J. 2014. Immunostimulatory activity of sulfated galactans isolated from the red seaweed *Gracilaria fisheri* and development of resistance against white spot syndrome virus (WSSV) in shrimp. *Fish Shellfish Immunol* 36:52-60.

World Wildlife Fund (WWF) Indonesia. 2014. *Better Management Practice, Seri Panduan Perikanan Skala Kecil, Budidaya Udang Vannamei*: Tambak Semi Intensif dengan Pengolahan Air Limbah (IPAL). Jakarta Selatan: WWF Indonesia Edisi 1 Desember 2014.

Wyban, J.A. and Sweeney, J.N. 1991. *Intensive shrimp production technology*. High Health Aquaculture, Hawaii, USA pp: 158.

Wyban, J.A., J.S. Swingle., J.N. Sweeney dan G.D. Pruder. 1993. Specific Pathogen Free *Penaeus vannamei*.*World Aquac.* 24: 39-45.

Xie, S., Zhang, X., Zhang, J., Li, F and Xiang, J. 2015. Envelope Proteins of White Spot Syndrome Virus (WSSV) Interact with *Litopenaeus vannamei* Peritrophin-Like Protein (LvPT). PLoS One 10(12): e0144922.

Xie, X., Xu,L and Yang, F. 2006. Proteomic analysis of the major envelope and nucleocapsid proteins of white spot syndrome virus.*Virol.* 80(21): 10615-23.

Yanto, H. 2007. Diagnosa dan Identifikasi Penyakit Udang Asal Tambak Intensif dan Panti Benih di Kalimantan Barat.*J. Universitas Muhammadiyah Surakarta* 7(1).

Yao, C.L., Ji, P.F., Wang, Z.Y., Li, F.H and Xiang, J.H. 2010.Molecular cloning and expression of NOS in shrimp, *Litopenaeus vannamei*.*Fish Shellfish Immunol*. 28(3):453-460.

Yeh, S.P., Chen, Y.N., Hsieh, S.L., Cheng, W and Liu, C.H. 2009. Immune response of white shrimp, *Litopenaeus vannamei*, after a concurrent

infection with white spot syndrome virus and infectious hypodermal and hematopoietic necrosis virus.*Fish Shellfish Immunol.* 26:582-588.

Yin, G., Jeney, G., Racz, T., Xu, P., Jun, X and Jeney, Z. 2006.Effect of two Chinese herbs *(Astragalus radix* and *Scutellaria radix)* on non-specific immune response of Tilapia, *Oreochromis niloticus. Aquaculture* 253(1-4): 39-47.

Yu, X.Q and Kanost, M.R. 2002.Binding of hemolim to bacterial lipopolysaccharide and lipoteichoic acid.An immunoglobulin superfamily member from insects as a pattern-recognition receptor.*Eur Biochem* 269:1827-34.

Yudiati, E., Isnansetyo, A., Murwantoko, Ayuningtyas, Triyanto, Handayani, C.R. Innate immune-stimulating and immune genes up-regulating activities of three types of alginate from *Sargassum siliquosum* in Pacific white shrimp, *Litopenaeus vannamei*. *Fish Shellfish Immunol.* 54: 46-53.

Yustianti, M., N. Ibrahim dan Ruslaini. 2013. Pertumbuhan dan Sintasan Larva Udang Vaname *(Litopenaeus vannamei)* Melalui Substitusi Tepung Ikan dengan Tepung Usus Ayam. *Mina Laut Indonesia* 1(1): 93-103.

Zaleski, M and M.C. Claps. 2000. First Record of Some Peritrichs Ciliates for San Miguel Del Monte Pond (Buenos Aires, Argentina). Institute of Limnology "Dr. R. Ringuelet". Florencio Farela. Argentina.

Zhang, W.B and Wang, Y.H. 1998. White spot syndrome virus infection of cultured shrimp in China. *Aquat. Anim. Health* 10:405-410.

Zhang, X.W., Xu, W.T., Wang, XW., Mu, Y., Zhao XF., Yu, XQ and Wang. 2009. A Novel *C-Type Lectin* with Two CRD Domains from Chinese shrimp *Fenneropenaeus chinensis* Functions As A Pattern Recognition Protein. *Mol. Immunol* 21:442-452.