國立臺灣海洋大學食品科學系碩士班
專題討論書面報告

改善養殖蝦感染急性肝胰臟壞死綜合症 (AHPNS) 之探討

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報告日期：107 年 09 月 19 日

內容	時間掌控	表達能力	投影片	書面資料
40%	10%	30%	10%	10%

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2018/09/19

大綱

摘要

急性肝胰臟壞死綜合症 (AHPND) 又稱早期死亡綜合症，是一種細菌性疾病，並嚴重影響蝦類養殖業。造成蝦子患上 AHPND 主要原因是因為腸炎弧菌感染所致，其含有稱為 $pirA^{vp}$ 和 $pirB^{vp}$ 之毒素基因。因此本報告目的為探討補充不同成份的飼料以改善蝦子感染 AHPND。在飼料添加硫酸半乳聚醣 (SG) 顯示出脂多醣和 β-1,3- 葡聚醣結合蛋白 (LGBP) 下游信號傳導以及免疫相關基因包括 p-NF-κB、IMD、IKKβ 和 IKKε ，抗菌胜肽 PEN-4 、proPO-I 和 II 的表現增強。在實驗第 12 天時，受感染之組別蝦子死亡率為 100%，而 0.5 SG、1 SG 和 2 SG 的死亡率分別是 73.14%、53.51%、52.34%。使用菌株 CDM8 或 CDA22 作為飼料添加劑，蝦子經過餵食後，第 21 天腸炎弧菌菌數顯著降低。與控制組相比，餵食含有 CDM8 或 CDA22 之飼料的養殖蝦，其死亡率分別為 36.7%、76.7% 和 88.3%，而控制組為 96.7%。此外，根據 qPCR 結果，顯示出 CDM8 或 CDA22 可以減少蝦子中含有 *pirA* 基因的腸炎弧菌生長。使用發酵蔬菜產品 (FVP) 餵食蝦子。結果顯示，FVP 顯著提升蝦子的免疫參數包括總血細胞計數、吞噬作用、酚氧化酶活性、活性氧化物質的產生和殺菌活性。此外，以 5.5g 和 55g FVP $(kg\ diet)^{-1}$ 的飼料餵食，抗菌胜肽和 (Toll-like receptor) 在各種組織中的表現有顯著上升。添加 FVP 的組別其蝦子累積死亡率有下降的情形。綜合上述結果，在飼料中通過添加 SG、益生菌和發酵蔬菜產品，能通過產生抗菌物質或增加免疫反應，增強蝦子對腸炎弧菌的抗性。

參考資料

Cabello, F. C. (2006). Heavy use of prophylactic antibiotics in aquaculture: a growing problem for human and animal health and for the environment. *Environmental Microbiology*, 8(7), 1137-1144.

De Almeida, C. L. F., Falcão, D. S., Lima, D. M., Gedson, R., Montenegro, D. A., Lira, N. S., De Athayde-Filho, P. F., Rodrigues, L. C., De Souza, M. F. V., Barbosa-Filho, J. M., & Batista, L. M. (2011). Bioactivities from marine algae of the genus Gracilaria. *International Journal of Molecular Sciences*, 12(7), 4550-4573.

Elshopakey, G. E., Risha, E. F., Abdalla, O. A., Okamura, Y., Harada, S., Kishida, S., Matsuura, Y., Sudhakaran, R.,& Itami, T. (2018). Efficacy of dietary fermented vegetable product on immune response, up-regulation of immune-related genes and protection of kuruma shrimp (*Marsupenaeus japonicus*) against *Vibrio parahaemolyticus*. *Aquaculture*, 497, 431-439.

Kawai, M., Matsuura, S., Asanuma, M., & Ogawa, N. (1998). Manda, a fermented natural food, suppresses lipid peroxidation in the senescent rat brain. *Neurochemical Research*, 23(4), 455-461.

Kim, D. C., & Hwang, W. I. (2003). In vitro antioxidant and anticancer activities of extracts from a fermented food. *Journal of Food Biochemistry*, 27(6), 449-459.

Leyva-Madrigal, K. Y., Luna-González, A., Escobedo-Bonilla, C. M., Fierro-Coronado, J. A., & Maldonado-Mendoza, I. E. (2011). Screening for potential probiotic bacteria to reduce prevalence of WSSV and IHHNV in whiteleg shrimp (*Litopenaeus vannamei*) under experimental conditions. *Aquaculture*, 322, 16-22.

Loh, J. Y. (2017). The Role of Probiotics and Their Mechanisms of Action: An Aquaculture Perspective. *World Aquaculture*, 19.

Neela, F. A., Nonaka, L., & Suzuki, S. (2007). The diversity of multi-drug resistance

profiles in tetracycline-resistant *Vibrio* species isolated from coastal sediments and seawater. *The Journal of Microbiology*, 45(1), 64-68.

Nunan, L., Lightner, D., Pantoja, C., & Gomez-Jimenez, S. (2014). Detection of acute hepatopancreatic necrosis disease (AHPND) in Mexico. *Diseases of Aquatic Organisms*, 111(1), 81-86.

Pham, D., Ansquer, D., Chevalier, A., Dauga, C., Peyramale, A., Wabete, N., & Labreuche, Y. (2014). Selection and characterization of potential probiotic bacteria for *Litopenaeus stylirostris* shrimp hatcheries in New Caledonia. *Aquaculture*, 432, 475-482.

Rudtanatip, T., Boonsri, N., Asuvapongpatana, S., Withyachumnarnkul, B., & Wongprasert, K. (2017). A sulfated galactans supplemented diet enhances the expression of immune genes and protects against *Vibrio parahaemolyticus* infection in shrimp. *Fish & Shellfish Immunology*, 65, 186-197.

Sapcharoen, P., & Rengpipat, S. (2013). Effects of the probiotic *Bacillus subtilis* (BP 11 and BS 11) on the growth and survival of Pacific white shrimp, *Litopenaeus vannamei*. *Aquaculture Nutrition*, 19(6), 946-954.

Shimada, T., Motonaga, C., Matsuura, S., Takagaki, M., Ashida, T., Okano, T., & Mortii, H. (2004). Effects of a Fermented Vegetable Product on Fat Deposition and Bone Metabolism in variectomized Rats. *Journal of Nutritional Science and Vitaminology*, 50(6), 422-425.

Takahashi, Y., Itami, T., Maeda, M., & Kondo, M. (1998). Bacterial and viral diseases of kuruma shrimp (*Penaeus japonicus*) in Japan. *Fish Pathology*, 33(4), 357-364.

Thuy, H. T. T., & Loan, T. T. C. (2011). Antibiotic contaminants in coastal wetlands from Vietnamese shrimp farming. *Environmental Science & Pollution Research*, 18(6), 835-841.

Tran, L., Nunan, L., Redman, R. M., Mohney, L. L., Pantoja, C. R., Fitzsimmons, K.,

& Lightner, D. V. (2013). Determination of the infectious nature of the agent of acute hepatopancreatic necrosis syndrome affecting penaeid shrimp. *Diseases of Aquatic Organisms*, 105(1), 45-55.

Wang, H., Wang, C., Tang, Y., Sun, B., Huang, J., & Song, X. (2018). *Pseudoalteromonas* probiotics as potential biocontrol agents improve the survival of *Penaeus vannamei* challenged with acute hepatopancreatic necrosis disease (AHPND)-causing *Vibrio parahaemolyticus*. *Aquaculture*, 494, 30-36.

Wu, Y., Wen, J., Ma, Y., Ma, X., & Chen, Y. (2014). Epidemiology of foodborne disease outbreaks caused by *Vibrio parahaemolyticus*, China, 2003–2008. *Food Control*, 46, 197-202.

Yamamoto, H. (1999). Postoperative effect of Manda on NK cell activity in cancer patients. *Biotherapy*, 13, 805-809.

Yang, Y., Sitanggang, N. V., Okazaki, Y., Tomotake, H., Arita, K., Ashida, T., & Kato, N. (2015). Supplemental fermented plant product (‘Manda Koso’) reduces succinate and deoxycholate, as well as elevates IgA and mucin levels, in rats fed a high-fat diet. *Biomedical Reports*, 3(6), 787-791.