

## 1.8 References

- Abd El-Hack, M. E., El-Saadony, M. T., Nader, M. M., Salem, H. M., El-Tahan, A. M., Soliman, S. M., & Khafaga, A. F. (2022). Effect of environmental factors on growth performance of Nile tilapia (*Oreochromis niloticus*). *International Journal of Biometeorology*, 66(11), 2183–2194. <https://doi.org/10.1007/s00484-022-02347-6>.
- Abd El-latif, A., Abd El-Gawad, E., & Emam, M. (2015). Effect of dietary fructo-oligosaccharide supplementation on feed utilization and growth performance of Nile tilapia (*Oreochromis niloticus*) fingerlings. *Egyptian Journal for Aquaculture*, 5(3), 1–16. <https://doi.org/10.21608/eja.2019.46730>.
- Abdel-Latif, H. M. R., Yilmaz, E., Dawood, M. A. O., Ringø, E., Ahmadifar, E., & Yilmaz, S. (2022). Shrimp vibriosis and possible control measures using probiotics, postbiotics, prebiotics, and synbiotics: A review. *Aquaculture*, 551, 737951. <https://doi.org/10.1016/j.aquaculture.2022.737951>.
- Abdul-Kari, Z., Kabir, M. A., Mat, K., Rusli, N. D., Razab, M. K. A. A., Ariff, N. S. N. A., Edinur, H. A., Rahim, M. Z. A., Pati, S., Dawood, M. A. O., & Wei, L. S. (2021). The possibility of replacing fish meal with fermented soy pulp on the growth performance, blood biochemistry, liver, and intestinal morphology of African catfish (*Clarias gariepinus*). *Aquaculture Reports*, 21, 100815. <https://doi.org/10.1016/j.aqrep.2021.100815>.
- Adel, M., Yeganeh, S., Dawood, M. A. O., Safari, R., & Radhakrishnan, S. (2017). Effects of *Pediococcus pentosaceus* supplementation on growth performance, intestinal microflora and disease-resistance of white shrimp, *Litopenaeus vannamei*. *Aquaculture Nutrition*, 23(6), 1401- 1409. <https://doi.org/10.1111/anu.12515>.
- Ahmadifar, E., Sheikhzadeh, N., Roshanaei, K., Dargahi, N., & Faggio, C. (2019). Can dietary ginger (*Zingiber officinale*) alter biochemical and immunological parameters and gene expression related to growth, immunity and antioxidant system in zebrafish (*Danio rerio*)? *Aquaculture*, 507, 341–348. <https://doi.org/10.1016/j.aquaculture.2019.04.049>.
- Ahmadnia, M. H. R., Farhangi, M., Rafiee, G., & Noori, F. (2012). Modulating gut microbiota and digestive enzyme activities of *Artemia urmiana* by administration of different levels of *Bacillus subtilis* and *Bacillus licheniformis*. *Aquaculture International*, 20(4), 693–705. <https://doi.org/10.1007/s10499-012-9497-5>.
- Akhter, N., Wu, B., Memon, A. M., & Mohsin, M. (2015). Probiotics and prebiotics associated with aquaculture: A review. *Fish and Shellfish Immunology*, 45(2), 733–741. <https://doi.org/10.1016/j.fsi.2015.05.038>.
- Akram, W., & Garud, N. (2020). Optimization of inulin production process parameters using response surface methodology. *Future Journal of Pharmaceutical Sciences*, 6(1), 1–9. <https://doi.org/10.1186/s43094-020-00087-1>.
- Alam, M. K. (2021). A comprehensive review of sweet potato (*Ipomoea batatas* [L.] Lam): Revisiting the associated health benefits. *Trends in Food Science and Technology*, 115,512–529. <https://doi.org/10.1016/j.tifs.2021.07.001>.
- Alexander, I. J., Bulan, R., Zaidar, E., Silaban, R., Soripada, T. A., & Sirait, G. (2023). The analysis of inulin from Yam Tubers using FTIR (fourier transform infra red). *International Journal of Computer Applications Technology and Research*, 12(03), 53–55. <https://doi.org/10.7753/ijcatr1203.1012>.

- Alfano, V., Stefanoni, W., Latterini, F., & Liuzzi, F. (2022). Inulin Content in Chipped Roots of Cardoon Stored at Different Initial Moisture Contents After Six Month Storage. 10, 1-9. <https://doi.org/10.3389/fenrg.2022.834443>.
- Ali, S. R., Ambasankar, S., Kondusamy, Praveena, P. E., Nandakumar, S., & Saiyad Musthafa, M. (2018). Effect of dietary prebiotic inulin on histology, immuno-haematological and biochemical parameters of Asian seabass (*Lates calcarifer*). *Aquaculture Research*, 49(8), 2732–2740. <https://doi.org/10.1111/are.13734>.
- Allam, B. W., Khalil, H. S., Mansour, A. T., Srour, T. M., Omar, E. A., & Nour, A. A. M. (2020). Impact of substitution of fish meal by high protein distillers dried grains on growth performance, plasma protein and economic benefit of striped catfish (*Pangasianodon hypophthalmus*). *Aquaculture*, 517, 734792. <https://doi.org/10.1016/j.aquaculture.2019.734792>.
- Amin, A., El Asely, A., Abd El-Naby, A. S., Samir, F., El-Ashram, A., Sudhakaran, R., & Dawood, M. A. O. (2019). Growth performance, intestinal histomorphology and growth-related gene expression in response to dietary *Ziziphus mauritiana* in Nile tilapia (*Oreochromis niloticus*). *Aquaculture*, 512, 734301. <https://doi.org/10.1016/j.aquaculture.2019.734301>.
- Amoah, K., Huang, Q. C., Tan, B. P., Zhang, S., Chi, S. Y., Yang, Q. H., Liu, H. Y., & Dong, X. H. (2019). Dietary supplementation of probiotic *Bacillus coagulans* ATCC 7050, improves the growth performance, intestinal morphology, microflora, immune response, and disease confrontation of Pacific white shrimp, *Litopenaeus vannamei*. *Fish and Shellfish Immunology*, 87, 796–808. <https://doi.org/10.1016/j.fsi.2019.02.029>.
- Andrianto, D., Bintang, M., Aziz, I. A., & Hermita, S. (2022). Characterization of Chemical Properties of Inulin Isolated from Yacón Tuber. *Jurnal Teknologi Dan Industri Pangan*, 33(2), 111-118. <https://doi.org/10.6066/jtip.2022.33.2.111>.
- Anokyewaa, M. A., Amoah, K., Li, Y., Lu, Y., Kuebutornye, F. K. A., Asiedu, B., & Seidu, I. (2021). Prevalence of virulence genes and antibiotic susceptibility of *Bacillus* sp used in commercial aquaculture probiotics in China. *Aquaculture Reports*, 21, 100784. <https://doi.org/10.1016/j.aqrep.2021.100784>.
- AOAC. (2019). Official Methods of Analysis of the Association of Official Analytical Chemists: Official Methods of Analysis of AOAC International. 21st Edition, AOAC, Washington DC.
- Arshad, N., Samat, N., & Lee, L. K. (2022). Insight Into the Relation Between Nutritional Benefits of Aquaculture Products and its Consumption Hazards: A Global Viewpoint. *Frontiers in Marine Science*, 9(July), 1–20. <https://doi.org/10.3389/fmars.2022.925463>.
- Aryati, Y., Widanarni, W., Wahjuningrum, D., Rusmana, I., & Lusiastuti, A. M. (2021). The effect of dietary honey prebiotic on microbiota diversity in the digestive tract of Nile tilapia (*Oreochromis niloticus*) and its growth performance. *Aquaculture Research*, 52(3), 1215–1226. <https://doi.org/10.1111/are.14980>.
- Aslamyah, S., Karim, M. Y., & Badraeni. (2018). Effects of Dosage of Mix.Microorgan-isms in Feed Raw Materials Fermentation Containing Sargassum sp. on Growth Performance, Chemical Body Composition and Hepatosomatic Index of Milkfish, *Chanos chanos* Forsskal. *Torani Jurnal of Fisheries and Marine Science*, 1(2), 59–70.
- Assefa, A., & Abunna, F. (2018). Maintenance of Fish Health in Aquaculture: Review of Epidemiological Approaches for Prevention and Control of Infectious Disease of Fish. *Veterinary Medicine International*, 2018. <https://doi.org/10.1155/2018/5432497>.

- Assefa, W., & Getahun, A. (2015). The Food and Feeding Ecology of Nile Tilapia, *Oreochromis niloticus*, in Lake Hayq, Ethiopia. *International Journal of Ecology and Environmental Sciences*, 41(2), 55-66. <https://www.researchgate.net/publication/328190261>.
- Assouhoun, W. L. A. (2022). Survival Ability during Freeze-Drying and Subsequent Storage of Probiotic Lactic Acid Bacteria Isolated from Traditional Fermented Cereal-Based Products. *International Journal of Current Microbiology and Applied Sciences*, 11(6), 145-155. <https://doi.org/10.20546/ijcmas.2022.1106.016>.
- Ayyat, M. S., Ayyat, A. M. N., Naiel, M. A. E., & Al-Sagheer, A. A. (2020). Reversal effects of some safe dietary supplements on lead contaminated diet induced impaired growth and associated parameters in Nile tilapia. *Aquaculture*, 515, 734580. <https://doi.org/10.1016/j.aquaculture.2019.734580>.
- Azad, M. A. K., Islam, S. S., Sithi, I. N., Ghosh, A. K., Banu, G. R., Bir, J., & Huq, K. A. (2019). Effect of probiotics on immune competence of giant freshwater prawn (*Macrobrachium rosenbergii*). *Aquaculture Research*, 50(2), 644–657. <https://doi.org/10.1111/are.13942>.
- Beccard, S., Bernard, J., Wouters, R., Gehrich, K., Zielbauer, B., Mezger, M., & Vilgis, T. A. (2019). Alteration of the structural properties of inulin gels. *Food Hydrocolloids*, 89, 302- 310. <https://doi.org/10.1016/j.foodhyd.2018.06.049>.
- Beck, B. R., Kim, D., Jeon, J., Lee, S. M., Kim, H. K., Kim, O. J., Lee, J. II, Suh, B. S., Do, H. K., Lee, K. H., Holzapfel, W. H., Hwang, J. Y., Kwon, M. G., & Song, S. K. (2015). The effects of combined dietary probiotics *Lactococcus lactis* BFE920 and *Lactobacillus plantarum* FGL0001 on innate immunity and disease resistance in olive flounder (*Paralichthys olivaceus*). *Fish and Shellfish Immunology*, 42(1), 177–183. <https://doi.org/10.1016/j.fsi.2014.10.035>.
- Bjørndal, T., Dey, M., & Tusvik, A. (2024). Economic analysis of the contributions of aquaculture to future food security. *Aquaculture*, 578(740071). <https://doi.org/https://doi.org/10.1016/j.aquaculture.2023.740071>.
- Cavalcante, R. B., Telli, G. S., Tachibana, L., Dias, D. de C., Oshiro, E., Natori, M. M., Silva, W. F. da, & Ranzani-Paiva, M. J. (2020). Probiotics, Prebiotics and Synbiotics for Nile tilapia: Growth performance and protection against *Aeromonas hydrophila* infection. *Aquaculture Reports*, 17, 1-8. 100343. <https://doi.org/10.1016/j.aqrep.2020.100343>.
- Cerezuela, R., Meseguer, J., & Esteban, M. A. (2011). Current knowledge in synbiotic use for fish aquaculture: A review. *Journal of Aquaculture Research and Development*, SPEC. ISSUE 1. <https://doi.org/10.4172/2155-9546.S1-008>.
- Chauhan, A., & Singh, R. (2019). Probiotics in aquaculture: a promising emerging alternative approach. *Symbiosis*, 77(2), 99–113. <https://doi.org/10.1007/s13199-018-0580-1>.
- Cortés-Herrera, C., Artavia, G., Leiva, A., & Granados-Chinchilla, F. (2019). Liquid chromatography analysis of common nutritional components, in feed and food. *Foods*, 8(1). <https://doi.org/10.3390/foods8010001>.
- Das, S., Mondal, K., & Haque, S. (2017). A review on application of probiotic, prebiotic and synbiotic for sustainable development of aquaculture. 5(2), 422–429.
- Davani-Davari, D., Negahdaripour, M., Karimzadeh, I., Seifan, M., Mohkam, M., Masoumi, S. J., Berenjian, A., & Ghasemi, Y. (2019). Prebiotics: Definition, types, sources, mechanisms, and clinical applications. *Foods*, 8(3), 1–27. <https://doi.org/10.3390/foods8030092>.

- Dawood, M. A. O., & Koshio, S. (2016). Recent advances in the role of probiotics and prebiotics in carp aquaculture: A review. *Aquaculture*, 454, 243–251. <https://doi.org/10.1016/j.aquaculture.2015.12.033>.
- Dawood, M. A. O., Eweedah, N. M., Khalafalla, M. M., Khalid, A., Asely, A. El, Fadl, S. E., Amin, A. A., Paray, B. A., & Ahmed, H. A. (2020). *Saccharomyces cerevisiae* increases the acceptability of Nile tilapia (*Oreochromis niloticus*) to date palm seed meal. *Aquaculture Reports*, 17(March), 100314. <https://doi.org/10.1016/j.aqrep.2020.100314>.
- Dawood, M. A. O., Koshio, S., Ishikawa, M., Yokoyama, S., El Basuini, M. F., Hossain, M. S., Nhu, T. H., Dossou, S., & Moss, A. S. (2016). Effects of dietary supplementation of *Lactobacillus rhamnosus* or/and *Lactococcus lactis* on the growth, gut microbiota and immune responses of red sea bream, *Pagrus major*. *Fish and Shellfish Immunology*, 49, 275–285. <https://doi.org/10.1016/j.fsi.2015.12.047>.
- Dawood, M. A. O., Koshio, S., & Esteban, M. Á. (2018). Beneficial roles of feed additives as immunostimulants in aquaculture: a review. *Reviews in Aquaculture*, 10(4), 950–974. <https://doi.org/10.1111/raq.12209>.
- Debnath, S. C., McMurtrie, J., Temperton, B., Delamare-Deboutteville, J., Mohan, C. V., & Tyler, C. R. (2023). Tilapia aquaculture, emerging diseases, and the roles of skin microbiomes in health and disease. In *Aquaculture International*. 31(5). Springer International Publishing. <https://doi.org/10.1007/s10499-023-01117-4>.
- Dehaghani, P. G., Baboli, M. J., Moghadam, A. T., ZiaeiNejad, S., & Pourfarhadi, M. (2015). Effect of synbiotic dietary supplementation on survival, growth performance, and digestive enzyme activities of common carp (*Cyprinus carpio*) fingerlings. *Czech Journal of Animal Science*, 60(5), 224- 232. <https://doi.org/10.17221/8172-CJAS>.
- Deines, A. M., Wittmann, M. E., Deines, J. M., & Lodge, D. M. (2016). Tradeoffs among Ecosystem Services Associated with Global Tilapia Introductions. *Reviews in Fisheries Science and Aquaculture*, 24(2), 178-191. <https://doi.org/10.1080/23308249.2015.1115466>.
- Dias, D. de C., Furlaneto, F. de P. B., Sussel, F. R., Tachibana, L., Gonçalves, G. S., Ishikawa, C. M., Natori, M. M., & Ranzani-Paiva, M. J. T. (2020). Economic feasibility of probiotic use in the diet of Nile tilapia (*Oreochromis niloticus*), during the reproductive period. *Acta Scientiarum - Animal Sciences*, 42(1), 1–8. <https://doi.org/10.4025/actascianimsci.v42i1.47960>.
- Doan, H.V., Wangkahart, E., Thaimuangphol, W. (2023). Effects of *Bacillus* spp. Mixture on Growth, Immune Responses, Expression of Immune-Related Genes, and Resistance of Nile tilapia Against *Streptococcus agalactiae* Infection. *Probiotics and Antimicro. Prot.* 15, 363-378. <https://doi.org/10.1007/s12602-021-09845-w>.
- Doan, H. V., Hoseinifar, S. H., Naraballobh, W., Jaturasitha, S., Tongsir, S., Chitmanat, C., & Ringø, E. (2019). Dietary inclusion of Orange peels derived pectin and *Lactobacillus plantarum* for Nile tilapia (*Oreochromis niloticus*) cultured under indoor biofloc systems. *Aquaculture*, 508, 98-105. <https://doi.org/10.1016/j.aquaculture.2019.03.067>.
- Dong, H. T., Techatanakitarnan, C., Jindakittikul, P., Thaiprayoon, A., Taengphu, S., Charoensapsri, W., Khunrae, P., Rattanarajpong, T., & Senapin, S. (2017). *Aeromonas jandaei* and *Aeromonas veronii* caused disease and mortality in Nile tilapia, *Oreochromis niloticus* (L.). *Journal of Fish Diseases*, 40(10), 1395–1403. <https://doi.org/10.1111/jfd.12617>.
- Eissa, E.-S., Ezzo, O.H., Khalil, H.S., Tawfik, W.A., El-Badawi, A.A., Abd Elghany, N.A., Mossa, M.I., Hassan, M.M., Hassan, M.M., Eissa, M.E.H., Shafi, M.E., Hamouda, A.H. (2022). The effect of

dietary nanocurcumin on the growth performance, body composition, haemato-biochemical parameters and histopathological scores of the Nile tilapia (*Oreochromis niloticus*) challenged with *Aspergillus flavus*. *Aquaculture Research*. 1-14.

<https://doi.org/10.1111/are.16084>.

- El-Nobi, G., Hassanin, M., Khalil, A. A., Mohammed, A. Y., Amer, S. A., Montaser, M. M., & El-Sharnouby, M. E. (2021). Synbiotic effects of *Saccharomyces cerevisiae*, mannan oligosaccharides, and  $\beta$ -glucan on innate immunity, antioxidant status, and disease resistance of Nile tilapia (*Oreochromis niloticus*). *Antibiotics*, 10(5), 1-11. <https://doi.org/10.3390/antibiotics10050567>.
- El-Ouny, Y. M., Maulu, S., Zaki, M. A. A., Helaly, A. A., Nour, A. A. M., ElBasuini, M. F., Labib, E. M. H., Khalil, R. H., Gouda, A. H., Hessein, A. A. A., Verdegem, M., & Khalil, H. S. (2023). Effect of fishmeal replacement with dried red wigglers (*Eisenia fetida*) worm meal on growth and feed utilization, production efficiency, and serum biochemistry in Nile tilapia (*Oreochromis niloticus*) fingerlings. *Aquaculture Reports*, 29, 101518. <https://doi.org/10.1016/j.aqrep.2023.101518>.
- El-Saadony, M. T., Alagawany, M., Patra, A. K., Kar, I., Tiwari, R., Dawood, M. A. O., Dhama, K., & Abdel-Latif, H. M. R. (2021). The functionality of probiotics in aquaculture: An overview. *Fish and Shellfish Immunology*, 117, 36–52. <https://doi.org/10.1016/j.fsi.2021.07.007>.
- El-Sayed, A. F. M., & Fitzsimmons, K. (2023). From Africa to the world. The journey of Nile tilapia. *Reviews in Aquaculture*, 15, 6-21. <https://doi.org/10.1111/raq.12738>.
- El-Sayed, A.-F. M. (2020). Tilapia distribution, transfers and introductions. In *Tilapia Culture* (Issue 1982). <https://doi.org/10.1016/b978-0-12-816509-6.00003-3>.
- Elumalai, P., Kurian, A., Lakshmi, S., Faggio, C., Esteban, M. A., & Ringø, E. (2020). Herbal Immunomodulators in Aquaculture. *Reviews in Fisheries Science and Aquaculture*, 33–57. <https://doi.org/10.1080/23308249.2020.1779651>.
- Endrawati, D., & Kusumaningtyas, E. (2018). Several Functions of *Rhizopus* sp on Increasing Nutritional Value of Feed Ingredient. *Indonesian Bulletin of Animal and Veterinary Sciences*, 27(2), 81. <https://doi.org/10.14334/wartazoa.v27i2.1181>.
- Eshaghzadeh, H., Hoseinifar, S. H., Vahabzadeh, H., & Ringø, E. (2015). The effects of dietary inulin on growth performances, survival and digestive enzyme activities of common carp (*Cyprinus carpio*) fry. *Aquaculture Nutrition*, 21(2), 242–247. <https://doi.org/10.1111/anu.12155>.
- Fan, Y., Liu, L., Zhao, L., Wang, X., Wang, D., Huang, C., Zhang, J., Ji, C., & Ma, Q. (2018). Influence of *Bacillus subtilis* ANSB060 on growth, digestive enzyme and aflatoxin residue in Yellow River carp fed diets contaminated with aflatoxin B1. *Food and Chemical Toxicology*, 113, 108–114. <https://doi.org/10.1016/j.fct.2018.01.033>.
- FAO. (2015). *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication*. Rome. [www.fao.org/3/i4356en/i4356EN.pdf](http://www.fao.org/3/i4356en/i4356EN.pdf)
- FAO. (2020). *The State of World Fisheries and Aquaculture 2020. Sustainability in action*. Rome. 244 pp.
- FAO. (2022). *The State of World Fisheries and Aquaculture 2022*. Rome, FAO, Towards Blue Transformation. <https://doi.org/10.4060/cc0461en>.

- Fares, M. M., & Salem, M. S. (2015). Dissolution enhancement of curcumin via curcumin-prebiotic inulin nanoparticles. *Drug Development and Industrial Pharmacy*, 41(11), 1785 -1792. <https://doi.org/10.3109/03639045.2015.1004184>.
- Fath El-Bab, A. F., Majrashi, K. A., Sheikh, H. M., Shafi, M. E., El-Ratel, I. T., Neamat-Allah, A. N. F., El-Raghi, A. A., Elazem, A. Y. A., Abd-Elghany, M. F., Abdelnour, S. A., Abduh, M. S., Jaremko, M., & Naiel, M. A. E. (2022). Dietary supplementation of Nile tilapia (*Oreochromis niloticus*) with  $\beta$ -glucan and/or *Bacillus coagulans*: Synergistic impacts on performance, immune responses, redox status and expression of some related genes. *Frontiers in Veterinary Science*, 9, 1-15. <https://doi.org/10.3389/fvets.2022.1011715>.
- Feitosa, F. L. B., Braz, C. U., Lemos, M. V. A. D., Berton, M. P., Silva, R. M. D. O., Tonussi, R. L., Peripolli, E., Olivieri, B. F., Ferrinho, A. M., Mueller, L. F., Furlan, J. D. J. M., Pereira, A. S. C., de Albuquerque, L. G., Schenkel, F. S., & Baldi, F. (2017). 207 Genome-wide association study for beef fatty acid profile using haplotypes in Nelore cattle. *Journal of Animal Science*, 95(suppl\_4), 102–103. <https://doi.org/10.2527/asasann.2017.207>.
- Fentie, E. G., Lim, K., Jeong, M., & Shin, J. H. (2024). A comprehensive review of the characterization, host interactions, and stabilization advancements on probiotics: Addressing the challenges in functional food diversification. *Comprehensive Reviews in Food Science and Food Safety*, 23(5), 1–41. <https://doi.org/10.1111/1541-4337.13424>.
- Furuya, W. M., Cruz, T. P. da, & Gatlin, D. M. (2023). Amino Acid Requirements for Nile Tilapia: An Update. *Animals*, 13(5), 1–15. <https://doi.org/10.3390/ani13050900>.
- Gatesoupe, F. J. (1999). The use of probiotics in aquaculture. *Aquaculture*, 180, 147–165. [https://doi.org/10.1016/S0044-8486\(99\)00187-8](https://doi.org/10.1016/S0044-8486(99)00187-8).
- Gewaily, M. S., Abdo, S. E., Moustafa, E. M., Abdel-Kader, M. F., Abd El-Razek, I. M., El-Sharnouby, M., Alkafafy, M., Raza, S. H. A., El Basuini, M. F., Van Doan, H., & Dawood, M. A. O. (2021). Dietary synbiotics can help relieve the impacts of deltamethrin toxicity of Nile tilapia reared at low temperatures. *Animals*, 11(6). <https://doi.org/10.3390/ani11061790>.
- Gibson, G. R., Hutkins, R., Sanders, M. E., Prescott, S. L., Reimer, R. A., Salminen, S. J., Scott, K., Stanton, C., Swanson, K. S., Cani, P. D., Verbeke, K., & Reid, G. (2017). Expert consensus document: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics. *Nature Reviews Gastroenterology and Hepatology*, 14(8), 491–502. <https://doi.org/10.1038/nrgastro.2017.75>.
- Gram, L., Melchiorson, J., Spanggaard, B., Huber, I., Al, G. E. T., & Icrobiol, A. P. P. L. E. N. M. (1999). AH2, a Possible Probiotic Treatment of Fish. *Society*, 65(3), 969–973.
- Grube, M., Bekers, M., Upite, D., & Kaminska, E. (2002). Infrared spectra of some fructans spectroscopy: An International Journal, 16(34), 289-296. <https://doi.org/10.1155/2002/637587>.
- Guo, X., Chen, D. D., Peng, K. S., Cui, Z. W., Zhang, X. J., Li, S., & Zhang, Y. A. (2016). Identification and characterization of *Bacillus subtilis* from grass carp (*Ctenopharyodon idellus*) for use as probiotic additives in aquatic feed. *Fish and Shellfish Immunology*, 52, 74–84. <https://doi.org/10.1016/j.fsi.2016.03.017>.
- Gupta, A., Verma, G., & Gupta, P. (2016). Growth performance, feed utilization, digestive enzyme activity, innate immunity and protection against *Vibrio harveyi* of freshwater prawn, *Macrobrachium rosenbergii* fed diets supplemented with *Bacillus coagulans*. *Aquaculture International*, 24(5), 1379–1392. <https://doi.org/10.1007/s10499-016-9996-x>.

- Hadinia, N., Edalatian Dovom, M. R., & Yavarmanesh, M. (2022). The effect of fermentation conditions (temperature, salt concentration, and pH) with *Lactobacillus* strains for producing Short Chain Fatty Acids. *Lwt*, 165, 1-11. Hossain, M. S., Koshio, S., & Kestemont, P. (2020). Recent advances of nucleotide nutrition research in aquaculture: a review. *Reviews in Aquaculture*, 12(2), 1028–1053. <https://doi.org/10.1111/raq.12370>.
- Hai, N. V. (2015). The use of probiotics in aquaculture. *Journal of Applied Microbiology*, 119(4), 917–935. <https://doi.org/10.1111/jam.12886>.
- Hassaan, M. S., Soltan, M. A., & Abdel-Moez, A. M. (2015). Nutritive value of soybean meal after solid state fermentation with *Saccharomyces cerevisiae* for Nile tilapia (*Oreochromis niloticus*). *Animal Feed Science and Technology*, 201, 89–98. <https://doi.org/10.1016/j.anifeedsci.2015.01.007>.
- Hassanien, A. E., El-Moghazy, G. M., Iraqi, M., Mahmoud, M., & Elsayad, M. A. S. and G. A. (2017). Physiological and haematological responses of the Nile tilapia (*Oreochromis niloticus*) fed on diets supplemented with probiotics. *Egyptian Journal of Aquatic Biology & Fisheries Zoology*, 21(1), 25–36. <https://doi.org/10.1016/j.agrformet.2007.11.012>.
- Hersi, M. A., Genc, E., Pipilos, A., & Keskin, E. (2023). Effects of dietary synbiotics and biofloc meal on the growth, tissue histomorphology, whole-body composition and intestinal microbiota profile of Nile tilapia (*Oreochromis niloticus*) cultured at different salinities. *Aquaculture*, 570, 1-11. 739391. <https://doi.org/10.1016/j.aquaculture.2023.739391>.
- Hiel, S., Bindels, L. B., Pachikian, B. D., Kalala, G., Broers, V., Zamariola, G., Chang, B. P. I., Kambashi, B., Rodriguez, J., Cani, P. D., Neyrinck, A. M., Thissen, J. P., Luminet, O., Bindelle, J., & Delzenne, N. M. (2019). Effects of a diet based on inulin-rich vegetables on gut health and nutritional behavior in healthy humans. *American Journal of Clinical Nutrition*, 109(6), 1683–1695. <https://doi.org/10.1093/ajcn/nqz001>.
- Hoseinifar, S. H., Esteban, M. Á., Cuesta, A., & Sun, Y. Z. (2015). Prebiotics and Fish Immune Response: A Review of Current Knowledge and Future Perspectives. *Reviews in Fisheries Science and Aquaculture*, 23(4), 315-328. <https://doi.org/10.1080/23308249.2015.1052365>.
- Huang, D., Liang, H., Ren, M., Ge, X., Zhang, Q., & Gu, J. (2022). The optimum dietary protein requirement of the genetically improved farmed tilapia (GIFT: *Oreochromis niloticus*): Effects on growth performance and protein metabolism via GH-IGF axis and TOR signalling pathway at different seasonal growth stages. *Aquaculture Research*, 53(15), 5413–5427. <https://doi.org/10.1111/are.16024>.
- Huyben, D., Nyman, A., Vidaković, A., Passoth, V., Moccia, R., Kiessling, A., Dicksved, J., & Lundh, T. (2017). Effects of dietary inclusion of the yeasts *Saccharomyces cerevisiae* and *Wickerhamomyces anomalus* on gut microbiota of rainbow trout. *Aquaculture*, 473(2016), 528–537. <https://doi.org/10.1016/j.aquaculture.2017.03.024> <https://doi.org/10.1016/j.lwt.2022.113709>.
- Huynh, T. G., Shiu, Y. L., Nguyen, T. P., Truong, Q. P., Chen, J. C., & Liu, C. H. (2017). Current applications, selection, and possible mechanisms of actions of synbiotics in improving the growth and health status in aquaculture: A review. *Fish and Shellfish Immunology*, 64, 367-382. <https://doi.org/10.1016/j.fsi.2017.03.035>.
- Ibrahim, M. D., Fathi, M., Mesalhy, S., & Abd El-Aty, A. M. (2010). Effect of dietary supplementation of inulin and vitamin C on the growth, hematology, innate immunity, and resistance of Nile tilapia

(*Oreochromis niloticus*). Fish and Shellfish Immunology, 29(2), 241 - 246. <https://doi.org/10.1016/j.fsi.2010.03.004>.

- Indah N, Zainal, Ganesa D. 2020. Comparison of freeze drying and foam mat drying effects on characteristics of inulin from gembili (*dioscorea esculenta*). IOP Conference Series: Materials Science and Engineering 885(1). DOI: <https://doi.org/10.1088/1757-899X/885/1/012046>.
- Ismail, M., Wahdan, A., Yusuf, M. S., Metwally, E., & Mabrok, M. (2019). Effect of dietary supplementation with a synbiotic (Lacto Forte) on growth performance, haematological and histological profiles, the innate immune response and resistance to bacterial disease in *Oreochromis niloticus*. Aquaculture Research, 50(9), 2545–2562. <https://doi.org/10.1111/are.14212>.
- Jackson, P. P. J., Wijeyesekera, A., & Rastall, R. A. (2023). Inulin-type fructans and short-chain fructooligosaccharides—their role within the food industry as fat and sugar replacers and texture modifiers what needs to be considered. Food Science and Nutrition, 11(1), 17 - 38. <https://doi.org/10.1002/fsn3.3040>.
- Jahangiri, L., & Esteban, M. Á. (2018). Administration of probiotics in the water in finfish aquaculture systems: A review. Fishes, 3(3), 1-13. <https://doi.org/10.3390/fishes3030033>.
- Jauncey, K., 1998. Tilapia Feed and Feeding, Stirling, Scotland: Pisces Press Limited.
- Kaewarsar, E., Chaiyasut, C., Lailerd, N., Makhmrueng, N., Peerajan, S., & Sirilun, S. (2023). Optimization of Mixed Inulin, Fructooligosaccharides, and Galactooligosaccharides as Prebiotics for Stimulation of Probiotics Growth and Function. Foods, 12(1591), 1–19.
- Karimi, S., Soofiani, N. M., Mahboubi, A., Ferreira, J. A., Lundh, T., Kiessling, A., & Taherzadeh, M. J. (2021). Evaluation of Nutritional Composition of Pure Filamentous Fungal Biomass as a Novel Ingredient for Fish Feed. 1–14.
- Kavitha, M., Raja, M., & Perumal, P. (2018). Evaluation of probiotic potential of *Bacillus* spp. isolated from the digestive tract of freshwater fish *Labeo calbasu* (Hamilton, 1822). Aquaculture Reports, 11, 59–69. <https://doi.org/10.1016/j.aqrep.2018.07.001>.
- Kishawy, A. T. Y., Sewid, A. H., Nada, H. S., Kamel, M. A., El-Mandrawy, S. A. M., Abdelhakim, T. M. N., El-Murr, A. E. I., Nahhas, N. El, Hozzein, W. N., & Ibrahim, D. (2020). Mannan-oligosaccharides as a carbon source in biofloc boost dietary plant protein and water quality, growth, immunity and *aeromonas hydrophila* resistance in Nile tilapia (*Oreochromis niloticus*). Animals, 10(10), 1–24. <https://doi.org/10.3390/ani10101724>.
- Koch, J. F. A., de Oliveira, C. A. F., & Zanuzzo, F. S. (2021). Dietary  $\beta$ -glucan (MacroGard®) improves innate immune responses and disease resistance in Nile tilapia regardless of the administration period. Fish and Shellfish Immunology, 112, 56–63. <https://doi.org/10.1016/j.fsi.2021.02.014>.
- Kolida, S., & Gibson, G. R. (2011). Synbiotics in health and disease. Annual Review of Food Science and Technology, 2, 373–393. <https://doi.org/10.1146/annurev-food-022510-133739>.
- Kosasih, W., Pudjiraharti, S., Ratnaningrum, D., & Priatni, S. (2015). Preparation of Inulin from Dahlia Tubers. Procedia Chemistry, 16, 190–194. <https://doi.org/10.1016/j.proche.2015.12.035>.
- Krakowska-Sieprawska A, Kielbasa A, Rafińska K, Ligor M, Buszewski B. 2022. Modern Methods of Pre-Treatment of Plant Material for the Extraction of Bioactive Compounds. Molecules 27(3): 1-20. DOI: <https://doi.org/10.3390/molecules27030730>

- Kuebutornye, F. K. A., Abarike, E. D., & Lu, Y. (2019). A review on the application of *Bacillus* as probiotics in aquaculture. *Fish and Shellfish Immunology*, 87, 820–828. <https://doi.org/10.1016/j.fsi.2019.02.010>.
- Li, W., Huang, X., Lu, X., Jiang, B., Liu, C., Huang, Y., & Su, Y. (2022). Effects of dietary *Lactobacillus reuteri* on growth performance, nutrient retention, gut health and microbiota of the Nile tilapia (*Oreochromis niloticus*). *Aquaculture Reports*, 26, 101275. <https://doi.org/10.1016/j.aqrep.2022.101275>.
- Li, Y., Liu, H., Dai, X., Li, J., & Ding, F. (2018). Effects of dietary inulin and mannan oligosaccharide on immune related genes expression and disease resistance of Pacific white shrimp, *Litopenaeus vannamei*. *Fish and Shellfish Immunology*, 76, 78–92. <https://doi.org/10.1016/j.fsi.2018.02.034>.
- Li, Y., Yuan, W., Zhang, Y., Liu, H., & Dai, X. (2021). Single or combined effects of dietary arabinoxylan-oligosaccharide and inulin on growth performance, gut microbiota, and immune response in Pacific white shrimp *Litopenaeus vannamei*. *Journal of Oceanology and Limnology*, 39(2), 741-754. <https://doi.org/10.1007/s00343-020-9083-z>.
- Li, Z., Tran, N. T., Ji, P., Sun, Z., Wen, X., & Li, S. (2019). Effects of prebiotic mixtures on growth performance, intestinal microbiota and immune response in juvenile chu's croaker, *Nibea coibor*. In *Fish and Shellfish Immunology*. <https://doi.org/10.1016/j.fsi.2019.04.025>.
- Liang, D., Wu, F., Zhou, D., Tan, B., & Chen, T. (2023). Commercial probiotic products in public health: current status and potential limitations. *Critical Reviews in Food Science and Nutrition*, 64(19), 6455–6476. <https://doi.org/10.1080/10408398.2023.2169858>.
- Lin, H. L., Shiu, Y. L., Chiu, C. S., Huang, S. L., & Liu, C. H. (2017). Screening probiotic candidates for a mixture of probiotics to enhance the growth performance, immunity, and disease resistance of Asian seabass, *Lates calcarifer* (Bloch), against *Aeromonas hydrophila*. *Fish and Shellfish Immunology*, 60, 474–482. <https://doi.org/10.1016/j.fsi.2016.11.026>.
- Liu, H., Wang, S., Cai, Y., Guo, X., Cao, Z., Zhang, Y., Liu, S., Yuan, W., Zhu, W., Zheng, Y., Xie, Z., Guo, W., & Zhou, Y. (2017). Dietary administration of *Bacillus subtilis* HAINUP40 enhances growth, digestive enzyme activities, innate immune responses and disease resistance of tilapia, *Oreochromis niloticus*. *Fish and Shellfish Immunology*, 60(2017), 326–333. <https://doi.org/10.1016/j.fsi.2016.12.003>.
- Liu, J., Luo, D., Li, X., Xu, B., Zhang, X., & Liu, J. (2016). Effects of inulin on the structure and emulsifying properties of protein components in dough. *Food Chemistry*, 210, 235–241. <https://doi.org/10.1016/j.foodchem.2016.04.001>.
- Mair, G. C., Halwart, M., Derun, Y., & Costa-Pierce, B. A. (2023). A decadal outlook for global aquaculture. *Journal of the World Aquaculture Society*, 54(2). <https://doi.org/10.1111/jwas.12977>.
- Mazzola, G., Aloisio, I., Biavati, B., & Di Gioia, D. (2015). Development of a symbiotic product for newborns and infants. *Lwt*, 64(2), 727-734. <https://doi.org/10.1016/j.lwt.2015.06.033>.
- Melanie, H., Susilowati, A., Iskandar, Y. M., Lotulung, P. D., & Andayani, D. G. S. (2015). Characterization of inulin from local red dahlia (*Dahlia* sp. L) Tubers by Infrared Spectroscopy. *Procedia Chemistry*, 16, 78-84. <https://doi.org/10.1016/j.proche.2015.12.027>.
- Merrifield, D. L., Dimitroglou, A., Foey, A., Davies, S. J., Baker, R. T. M., Bøgwald, J., Castex, M., & Ringø, E. (2010). The current status and future focus of probiotic and prebiotic applications for salmonids. *Aquaculture*, 302(1–2), 1–18. <https://doi.org/10.1016/j.aquaculture.2010.02.007>.

- Meurer, F., Novodvorski, J., & Bombardelli, R. A. (2024). Protein requirements in Nile tilapia (*Oreochromis niloticus*) during production and reproduction phases. *Aquaculture and Fisheries*, 1-12. <https://doi.org/10.1016/j.aaf.2024.03.004>.
- Miller GL. 1959. Use of dinitrosalicylic acid reagent for determination of reducing sugar. *Journal of Analytical Chemistry*, 31: 426-428. <https://doi.org/10.1021/ac60147a030>.
- Mohammadi, G., Hafezieh, M., Karimi, A. A., Azra, M. N., Van Doan, H., Tapingkae, W., Abdelrahman, H. A., & Dawood, M. A. O. (2022). The synergistic effects of plant polysaccharide and *Pediococcus acidilactici* as a synbiotic additive on growth, antioxidant status, immune response, and resistance of Nile tilapia (*Oreochromis niloticus*) against *Aeromonas hydrophila*. *Fish and Shellfish Immunology*, 120, 304–313. <https://doi.org/10.1016/j.fsi.2021.11.028>.
- Mohammadi, G., Rafiee, G., El Basuini, M. F., Abdel-Latif, H. M. R., & Dawood, M. A. O. (2020). The growth performance, antioxidant capacity, immunological responses, and the resistance against *Aeromonas hydrophila* in Nile tilapia (*Oreochromis niloticus*) fed *Pistacia vera* hulls derived polysaccharide. *Fish and Shellfish Immunology*, 106, 36–43. <https://doi.org/10.1016/j.fsi.2020.07.064>.
- Mountzouris, K. C. (2022). Prebiotics: Types. *Encyclopedia of dairy sciences* (3rd ed., pp. 352–358). Academic Press.
- Mugwanya, M., Dawood, M. A. O., Kimera, F., & Sewilam, H. (2022). Updating the Role of Probiotics, Prebiotics, and Synbiotics for Tilapia Aquaculture as Leading Candidates for Food Sustainability: A Review. *Probiotics and Antimicrobial Proteins*, 14(1), 130–157. <https://doi.org/10.1007/s12602-021-09852-x>.
- Mugwanya, M., Dawood, M. A. O., Kimera, F., & Sewilam, H. (2022). Updating the role of probiotics, prebiotics, and synbiotics for tilapia aquaculture as leading candidates for food sustainability: a Review. *Probiotics and Antimicrobial Proteins*, 14(1), 130–157. <https://doi.org/10.1007/s12602-021-09852-x>.
- Munni, M. J., Akther, K. R., Ahmed, S., Hossain, M. A., & Roy, N. C. (2023). Effects of Probiotics, Prebiotics, and Synbiotics as an Alternative to Antibiotics on Growth and Blood Profile of Nile Tilapia (*Oreochromis niloticus*). *Aquaculture Research*, 1-12. <https://doi.org/10.1155/2023/2798279>.
- National Research Council (NRC), 2011. *Nutrient Requirements of Fish and Shrimp*. The National Academies Press, Washington, D.C., 376 pp.
- Nayak, S. K. (2010). Probiotics and immunity: A fish perspective. *Fish and Shellfish Immunology*, 29(1), 2 - 14. <https://doi.org/10.1016/j.fsi.2010.02.017>.
- Naylor, R. L., Hardy, R. W., Buschmann, A. H., Bush, S. R., Cao, L., Klinger, D. H., Little, D. C., Lubchenco, J., Shumway, S. E., & Troell, M. (2021). A 20-year retrospective review of global aquaculture. *Nature*, 591(7851), 551–563. <https://doi.org/10.1038/s41586-021-03308-6>.
- Nguyen, T. D., Chau, T. T., & Do, T. K. L. (2022). Study on designing and manufacturing the freeze-drying system with the process of freezing moist materials inside the freeze drying chamber to preserve valuable products. *Journal of Technical Education Science*, 70, 1-14. <https://doi.org/10.54644/jte.70b.2022.1136>.
- Nguyen, V. N., Onoda, S., Van Khanh, T., Hai, P. D., Trung, N. T., Hoang, L., & Koshio, S. (2019). Evaluation of dietary Heat-killed *Lactobacillus plantarum* strain L-137 supplementation on growth

- performance, immunity and stress resistance of Nile tilapia. *Aquaculture*, 498, 371-379. <https://doi.org/10.1016/j.aquaculture.2018.08.081>.
- Nunes, CS. (2018). Probiotics and enzymes in the gastrointestinal tract. Academic Press, pp. 413-427. <https://doi.org/10.1016/B978-0-12-805419-2.00021-6>.
- Nurdila, Imran, Kadidae, L. O., Kadir, L. A., & Ramadhan, L. O. A. N. (2019). Isolation of inulin oligomer from white yam tuber (*Dioscorea rotundata*) for preparation of curcumin-inulin nanoparticles. IOP Conference Series: Earth and Environmental Science, 382(1). <https://doi.org/10.1088/1755-1315/382/1/012013>.
- Okey, I. B., Gabriel, U. U., & Deekae, S. N. (2018). The Use of Synbiotics (Prebiotic & Probiotic) in Aquaculture Development. *Sumerianz Journal of Biotechnology*, 1(2), 51–60.
- Oktapiani, R., Haetami, K., Liviawaty, E., & Lili, W. (2021). Effect of Using Fermented Coconut Testa by *Rhizopus oryzae* on the Growth of Red Tilapia Seeds (*Oreochromis niloticus* Linnaeus, 1758). 162, 29–42.
- Ouwehand, A. C., Invernici, M. M., Furlaneto, F. A. C., & Messori, M. R. (2018). Effectiveness of Multistrain Versus Single-strain Probiotics Current Status and Recommendations for the Future. *Journal of Clinical Gastroenterology*, 52, 35–40. <https://doi.org/10.1097/MCG.0000000000001052>.
- Palmer, R. M., Sandbach, A., & Buckley, B. A. (2024). Tissue-specific effects of temperature and salinity on the cell cycle and apoptosis in the Nile Tilapia (*Oreochromis niloticus*). *Comparative Biochemistry and Physiology -Part A: Molecular and Integrative Physiology*, 297, 111706. <https://doi.org/10.1016/j.cbpa.2024.111706>.
- Petkova, N. T., & Denev, P. (2015). Methods for Determination of Inulin. *Food, Technologies & Health*, November. <https://doi.org/10.13140/RG.2.1.1790.4088>.
- Pilarski, F., Ferreira de Oliveira, C. A., Darpossolo de Souza, F. P. B., & Zanuzzo, F. S. (2017). Different  $\beta$ -glucans improve the growth performance and bacterial resistance in Nile tilapia. *Fish and Shellfish Immunology*, 70, 25–29. <https://doi.org/10.1016/j.fsi.2017.06.059>.
- Poolsawat, L., Li, X., Yang, H., Yang, P., Kabir Chowdhury, M. A., Yusuf, A., & Leng, X. (2020). The potentials of fructo-oligosaccharide on growth, feed utilization, immune and antioxidant parameters, microbial community and disease resistance of tilapia (*Oreochromis niloticus*  $\times$  *O. aureus*). *Aquaculture Research*, 51(11), 4430–4442. <https://doi.org/10.1111/are.14786>.
- Puvanasundram, P., Chong, C. M., Sabri, S., Yusoff, M. S., & Karim, M. (2021). Multi-strain probiotics: Functions, effectiveness and formulations for aquaculture applications. *Aquaculture Reports*, 21, 100905. <https://doi.org/10.1016/j.aqrep.2021.100905>.
- Ramos, M. A., Batista, S., Pires, M. A., Silva, A. P., Pereira, L. F., Saavedra, M. J., Ozório, R. O. A., & Rema, P. (2017). Dietary probiotic supplementation improves growth and the intestinal morphology of Nile tilapia. *Animal*, 11(8), 1259–1269. <https://doi.org/10.1017/S1751731116002792>.
- Rastegari, H., Nadi, F., Lam, S. S., Abdullah, M. I., Kasan, N. A., Rahmat, R. F., & Mahari, W. A. W. (2023). Internet of Things in aquaculture: A review of the challenges and potential solutions based on current and future trends. *Smart Agricultural Technology*, 4, 100187. <https://doi.org/10.1016/j.atech.2023.100187>.

- Redondo-Cuenca, A., Herrera-Vázquez, S. E., Condezo-Hoyos, L., Gómez-Ordóñez, E., & Rupérez, P. (2021). Inulin extraction from common inulin-containing plant sources. *Industrial Crops and Products*, 170, 1-8. <https://doi.org/10.1016/j.indcrop.2021.113726>.
- Retnaningtyas, Y., Wulandari, L., & Wimala, M. (2022). Inulin determination of yam bean tuber (*Pacorrhizus erosus* L.) water extract from different altitude areas using TLC- Densitometry. *Pharmaciana*, 12(1), 21. <https://doi.org/10.12928/pharmaciana.v12i1.21830>.
- Ringø, E. (2020). Probiotics in shellfish aquaculture. *Aquaculture and Fisheries*, 5(1), 1–27. <https://doi.org/10.1016/j.aaf.2019.12.001>.
- Rohani, M. F., Islam, S. M., Hossain, M. K., Ferdous, Z., Siddik, M. A., Nuruzzaman, M., Padeniya, U., Brown, C., & Shahjahan, M. (2022). Probiotics, prebiotics and synbiotics improved the functionality of aquafeed: Upgrading growth, reproduction, immunity and disease resistance in fish. *Fish and Shellfish Immunology*, 120, 569–589. <https://doi.org/10.1016/j.fsi.2021.12.037>.
- Saengkanuk, A., Nuchadomrong, S., Jogloy, S., Patanothai, A., & Srijaranai, S. (2011). A simplified spectrophotometric method for the determination of inulin in Jerusalem artichoke (*Helianthus tuberosus* L.) tubers. *European Food Research and Technology*, 233(4), 609–616. <https://doi.org/10.1007/s00217-011-1552-3>.
- Samaddar, A., Ghosh, T., & Verma, D. K. (2024). Global Diversification of Tilapia Production Techniques: Recent Overview- part 1. *Journal of Advances in Biology & Biotechnology*, 27(7), 745–760. <https://doi.org/10.9734/jabb/2024/v27i71034>.
- Samson, J. S. (2022). Effect of probiotic *Bacillus* spp.-supplemented feed on the growth, length-weight relationship, and condition factor of Nile tilapia (*Oreochromis niloticus*). *Journal of Experimental Biology and Agricultural Sciences*, 10(1), 90–96. [https://doi.org/10.18006/2022.10\(1\).90.96](https://doi.org/10.18006/2022.10(1).90.96).
- Savedboworn, W., Teawsomboonkit, K., Surichay, S., Riansa-ngawong, W., Rittisak, S., Charoen, R., & Phattayakorn, K. (2019). Impact of protectants on the storage stability of freeze-dried probiotic *Lactobacillus plantarum*. *Food Science and Biotechnology*, 28(3), 795–805. <https://doi.org/10.1007/s10068-018-0523-x>.
- Selim, K. M., & Reda, R. M. (2015). Beta-Glucans and Mannan Oligosaccharides Enhance Growth and Immunity in Nile Tilapia. *North American Journal of Aquaculture*, 77(1), 22 - 30. <https://doi.org/10.1080/15222055.2014.951812>.
- Sewaka, M., Trullas, C., Chotiko, A., Rodkhum, C., Chansue, N., Boonanuntanasarn, S., & Pirarat, N. (2019). Efficacy of synbiotic Jerusalem artichoke and *Lactobacillus rhamnosus* GG-supplemented diets on growth performance, serum biochemical parameters, intestinal morphology, immune parameters and protection against *Aeromonas veronii* in juvenile red tilapia (*Oreochromis spp.*). *Fish and Shellfish Immunology*, 86, 260–268.
- Shija, V. M., Amoah, K., & Cai, J. (2023). Effect of Bacillus Probiotics on the Immunological Responses of Nile Tilapia (*Oreochromis niloticus*): A Review. *Fishes*, 8(7), 1–16. <https://doi.org/10.3390/fishes8070366>.
- Shiri, A., Ehrampoush, M. H., Ardakani, S. A. Y., & Mollakhalili-Meybodi, N. (2023). Effect of inulin polymerization degree on nutritional and technological characteristics of gluten free bread. *The Journal of Toloobehdasht*, 22(1), 61–79. <https://doi.org/10.18502/tbj.v22i1.12780>.
- Shoaei, R., Akrami, R., Ghobadi, S., & Razeghi Mansour, M. (2015). Effect of dietary of prebiotic mannan oligosaccharide and  $\beta$ -1, 3 glucans on growth performance, survival, body composition

- and serum lysozyme activity in Rainbow trout (*Oncorhynchus mykiss*) fingerling. *Journal of Marine Biology*, 7(2), 45–56.
- Sidiq, M.J., Ganie, P.A., Sarma, D. (2024). Freshwater Aquaculture Assuring the Food and Livelihood Security in India: A Decadal Perspective (2011–2022). *Aquaculture and Conservation of Inland Coldwater Fishes*. Springer, Singapore. [https://doi.org/10.1007/978-981-97-1790-3\\_7](https://doi.org/10.1007/978-981-97-1790-3_7).
- Singarayar, M. S., Chandrasekaran, A., Balasundaram, D., Veerasamy, V., Neethirajan, V., & Thilagar, S. (2024). Prebiotics: Comprehensive analysis of sources, structural characteristics and mechanistic roles in disease regulation. *Microbial Pathogenesis*, 197, 107071. <https://doi.org/10.1016/j.micpath.2024.107071>.
- Sîrbu, E., Dima, M. F., Tenciu, M., Cretu, M., Tiberiu, M., & Cristea, V. (2022). Effects of Dietary Supplementation with Probiotics and Prebiotics on Growth, Physiological Condition, and Resistance to Pathogens Challenge in Nile Tilapia (*Oreochromis niloticus*). 7(273), 1–21. <https://doi.org/10.3390/fishes705027>.
- Song, S. K., Beck, B. R., Kim, D., Park, J., Kim, J., Kim, H. D., & Ringø, E. (2014). Prebiotics as immunostimulants in aquaculture: A review. *Fish and Shellfish Immunology*, 40(1), 40–48. <https://doi.org/10.1016/j.fsi.2014.06.016>.
- Souza, F. P. de, Lima, E. C. S. de, Pandolfi, V. C. F., Leite, N. G., Furlan-Murari, P. J., Leal, C. N. S., Mainardi, R. M., Suphoronski, S. A., Favero, L. M., Koch, J. F. A., Pereira, U. de P., & Lopera-Barrero, N. M. (2020). Effect of  $\beta$ -glucan in water on growth performance, blood status and intestinal microbiota in tilapia under hypoxia. *Aquaculture Reports*, 17. <https://doi.org/10.1016/j.aqrep.2020.100369>.
- Srisapoome, P., & Areechon, N. (2017). Efficacy of viable *Bacillus pumilus* isolated from farmed fish on immune responses and increased disease resistance in Nile tilapia (*Oreochromis niloticus*): Laboratory and on-farm trials. *Fish and Shellfish Immunology*, 67, 199–210. <https://doi.org/10.1016/j.fsi.2017.06.018>.
- Starovoitov, V. I., Starovoitova, O. A., Manokhina, A. A., & Balabanov, V. I. (2023). The influence of freeze drying on the quality indicators of potato tubers. *Web of Conferences*, 392, 1-7. <https://doi.org/10.1051/e3sconf/202339202031>.
- Steinfeld, B., Scott, J., Vilander, G., Marx, L., Quirk, M., Lindberg, J., & Koerner, K. (2015). The Role of Lean Process Improvement in Implementation of Evidence-Based Practices in Behavioral Health Care. *Journal of Behavioral Health Services and Research*, 42(4), 504–518. <https://doi.org/10.1007/s11414-013-9386-3>.
- Subedi, & Shrestha. (2021). Application of probiotics in aquaculture. *Animal and Fisheries Research (IJFAF)*, 4(7), 146–149. <http://www.thepharmajournal.com>.
- Sutthi, N., Thaimuangphol, W., Rodmongkoldee, M., Leelapatra, W., & Panase, P. (2018). Growth performances, survival rate, and biochemical parameters of Nile tilapia (*Oreochromis niloticus*) reared in water treated with probiotic. *Comparative Clinical Pathology*, 27(3), 597–603. <https://doi.org/10.1007/s00580-017-2633-x>.
- Tabassum, T., Sofi Uddin Mahamud, A. G. M., Acharjee, T. K., Hassan, R., Akter Snigdha, T., Islam, T., Alam, R., Khoiam, M. U., Akter, F., Azad, M. R., Al Mahamud, M. A., Ahmed, G. U., & Rahman, T. (2021). Probiotic supplementations improve growth, water quality, hematology, gut microbiota and intestinal morphology of Nile tilapia. *Aquaculture Reports*, 21, 100972. <https://doi.org/10.1016/j.aqrep.2021.100972>.

- Tan, H. Y., Chen, S. W., & Hu, S. Y. (2019). Improvements in the growth performance, immunity, disease resistance, and gut microbiota by the probiotic *Rummeliibacillus stabekisii* in Nile tilapia (*Oreochromis niloticus*). *Fish and Shellfish Immunology*, 92, 265–275. <https://doi.org/10.1016/j.fsi.2019.06.027>.
- Taoka, Y., Maeda, H., Jo, J.-Y., & Sakata, T. (2007). Influence of commercial probiotics on the digestive enzyme activities of tilapia, *Oreochromis niloticus*. *Aquaculture Science*, 55(2), 183–189.
- Thielemans, K., De Bondt, Y., Comer, L., Raes, J., Everaert, N., Sels, B. F., & Courtin, C. M. (2023). Decreasing the Crystallinity and Degree of Polymerization of Cellulose Increases Its Susceptibility to Enzymatic Hydrolysis and Fermentation by Colon Microbiota. *Foods*, 12(5), 1-14. <https://doi.org/10.3390/foods12051100>.
- Tiengtam, N., Khempaka, S., Paengkoum, P., & Boonanuntanasarn, S. (2015). Effects of inulin and Jerusalem artichoke (*Helianthus tuberosus*) as prebiotic ingredients in the diet of juvenile Nile tilapia (*Oreochromis niloticus*). *Animal Feed Science and Technology*, 207, 120-129. <https://doi.org/10.1016/j.anifeedsci.2015.05.008>.
- Tinh, N. T. N., Dierckens, K., Sorgeloos, P., & Bossier, P. (2008). A review of the functionality of probiotics in the larviculture food chain. *Marine Biotechnology*, 10(1), 1–12. <https://doi.org/10.1007/s10126-007-9054-9>.
- Tran, N. T., & Li, S. (2022). Potential role of prebiotics and probiotics in conferring health benefits in economically important crabs. *Fish and Shellfish Immunology Reports*, 3, 100041. <https://doi.org/10.1016/j.fsirep.2021.100041>.
- Villamil, L., Reyes, C., & Martínez-Silva, M. A. (2014). In vivo and in vitro assessment of *Lactobacillus acidophilus* as probiotic for tilapia (*Oreochromis niloticus*, Perciformes: Cichlidae) culture improvement. *Aquaculture Research*, 45(7), 1116-1125. <https://doi.org/10.1111/are.12051>.
- Waagbø, R., & Remø, S. C. (2020). Functional diets in fish health management. In *Aquaculture Health Management*. Elsevier Inc. <https://doi.org/10.1016/b978-0-12-813359-0.00007-5>.
- Wee, W., Abdul Hamid, N. K., Mat, K., Khalif, R. I. A. R., Rusli, N. D., Rahman, M. M., Kabir, M. A., & Wei, L. S. (2022). The effects of mixed prebiotics in aquaculture: A review. *Aquaculture and Fisheries*, <https://doi.org/10.1016/j.aaf.2022.02.005>.
- Wienberg, F., Hövels, M., & Deppenmeier, U. (2022). High-yield production and purification of prebiotic inulin-type fructooligosaccharides. *AMB Express*, 12(1). 1-16. <https://doi.org/10.1186/s13568-022-01485-9>.
- Xia, Y., Wang, M., Gao, F., Lu, M., & Chen, G. (2020). Effects of dietary probiotic supplementation on the growth, gut health and disease resistance of juvenile Nile tilapia (*Oreochromis niloticus*). *Animal Nutrition*, 6(1), 69–79. <https://doi.org/10.1016/j.aninu.2019.07.002>
- Yanti, I. G., Azhar, M., Faridah, A., & Oktavia, B. (2019). Simple Determination of Inulin Polymerization Degree Average from Dahlia Tuber Using Spectrophotometer. *International Journal of Research & Review*, 6(8), 399–404.
- Yeh, S. P., Chiu, C. H., Shiu, Y. L., Huang, Z. L., & Liu, C. H. (2014). Effects of diets supplemented with either individual or combined probiotics, *Bacillus subtilis* E20 and *Lactobacillus plantarum* 7-40, on the immune response and disease resistance of the mud crab, *Scylla paramamosain* (Estampador). *Aquaculture Research*, 45(7), 1164–1175. <https://doi.org/10.1111/are.12061>.

- Yilmaz, S., Yilmaz, E., Dawood, M. A. O., Ringø, E., Ahmadifar, E., & Abdel-Latif, H. M. R. (2022). Probiotics, prebiotics, and synbiotics used to control vibriosis in fish: A review. *Aquaculture*, 547, 737514. <https://doi.org/10.1016/j.aquaculture.2021.737514>.
- Yones, A. M. A. S. M., Eissa, I. A. M. M., El-Fattah Ali Ghobashy, M. A., & Marzok, S. S. (2020). Effects of dietary inulin as prebiotic on growth performance, immune hematological indices and ectoparasitic infection of fingerlings Nile tilapia, (*Oreochromis niloticus*). *Egyptian Journal of Histology*, 43(1), 88–103. <https://doi.org/10.21608/ejh.2019.15495.1152>.
- Yu, S., Li, Q., Wang, Z., & Zhao, W. (2024). Innovative application of a novel and thermostable inulin fructotransferase from *Arthrobacter* sp. ISL-85 to fructan inulin in burdock root to improve nutrition. *Food Chemistry*, 441, 11-8. <https://doi.org/10.1016/j.foodchem.2023.138336>.
- Yudhistira, B., Saputri, K. E., & Prabawa, S. (2022). The effect of white sweet potatoes (*Ipomea batatas* L.) inulin extract addition on the characteristics of white bread with soybean flour substitution. *Food Research*, 6(4), 218 227. [https://doi.org/10.26656/fr.2017.6\(4\).360](https://doi.org/10.26656/fr.2017.6(4).360).
- Yudhistira, B., Siswanti, & Luwidharto, J. C. N. (2020). The Effect of Solvent Ratio and Precipitation Time on Isolation of Inulin from White Sweet Potato (*Ipomoea batatas* L.). *IOP Conference Series: Earth and Environmental Science*, 518(1). <https://doi.org/10.1088/1755-1315/518/1/012009>.
- Yue, F., Zhang, J., Xu, J., Niu, T., Lü, X., & Liu, M. (2022). Effects of monosaccharide composition on quantitative analysis of total sugar content by phenol sulfuric acid method. *Frontiers in Nutrition*, 9(3), 1-10. <https://doi.org/10.3389/fnut.2022.963318>.
- Zabidi, A., Yusoff, F., Amin, N., Jasmin, N., Yaminudin, M., Puvanasundram, P., Marlina, M., & Karim, A. (2021). Disease resistance of red hybrid tilapia (*Oreochromis* spp.) fingerlings in a biofloc system. *Animals*, 11, 1–16.
- Zhang, C. N., Li, X. F., Xu, W. N., Zhang, D. D., Lu, K. L., Wang, L. N., Tian, H. Y., & Liu, W. B. (2015). Combined effects of dietary fructooligosaccharide and *Bacillus licheniformis* on growth performance, body composition, intestinal enzymes activities and gut histology of triangular bream (*Megalobrama terminalis*). *Aquaculture Nutrition*, 21(5), 755–766. <https://doi.org/10.1111/anu.12200>.
- Zhang, P., Cao, S., Zou, T., Han, D., Liu, H., Jin, J., Yang, Y., Zhu, X., Xie, S., & Zhou, W. (2018). Effects of dietary yeast culture on growth performance, immune response and disease resistance of gibel carp (*Carassius auratus*). *Fish and Shellfish Immunology*, 82, 400–407. <https://doi.org/10.1016/j.fsi.2018.08.044>.