

system choice and intensity to cost structure. Reviews of cost-benefit analysis show that production-system assessment should account for environmental externalities as well as direct financial returns, while empirical evidence from intensive aquaculture indicates that higher-performing systems can lower unit costs by spreading fixed costs across greater output, even though technologies such as RAS remain vulnerable to feed and energy prices and therefore require careful control of electricity, water, and feed use.

References

- Ahmed N., and Turchini G., 2021, Recirculating aquaculture systems (ras): environmental solution and climate change adaptation, *Journal of Cleaner Production*, 297: 126604.
<https://doi.org/10.1016/j.jclepro.2021.126604>
- Canosa L., and Bertucci J., 2023, The effect of environmental stressors on growth in fish and its endocrine control, *Frontiers in Endocrinology*, 14: 1109461.
<https://doi.org/10.3389/fendo.2023.1109461>
- Deng Y., Mao C., Chen H., Wang B., Cheng C.H., Guo Z., Feng J., and Su Y., 2021, Shifts in pond water bacterial communities are associated with the health status of sea bass (*Lateolabrax maculatus*), *Ecological Indicators*, 127: 107775.
<https://doi.org/10.1016/j.ecolind.2021.107775>
- Ezhilmathi S., Ahilan B., Uma A., Felix N., Cheryl A., and Lingam S.S.R., 2022, Effect of stocking density on growth performance, digestive enzyme activity, body composition and gene expression of asian seabass reared in recirculating aquaculture system, *Aquaculture Research*, 53(5): 1963-1972.
<https://doi.org/10.1111/are.15725>
- Fei F., Fang Y., Zhu Z., Liu X., Li A., Zhang J., Gao X., Li W., Yang H., Li W., Zhang C., and Liu B., 2025, Impact of flow velocity on growth performance, muscle texture, and nutritional composition in seabass (*Lateolabrax maculatus*), *Aquaculture International*, 33(2): 111.
<https://doi.org/10.1007/s10499-024-01787-8>
- Gupta S., Makridis P., Henry I., Velle-George M., Ribicic D., Bhatnagar A., Skalska-Tuomi K., Daneshvar E., Ciani E., Persson D., and Netzer R., 2024, Recent developments in recirculating aquaculture systems: a review, *Aquaculture Research*, 2024(1): 6096671.
<https://doi.org/10.1155/are/6096671>
- He R., Su Y., Wang A., Lei B., and Cui K., 2020, Survival and serum biochemical responses of spotted sea bass *Lateolabrax maculatus* during simulated waterless live transportation, *Aquaculture Research*, 51(9): 3495-3505.
<https://doi.org/10.1111/are.14685>
- Holhorea P., Naya-Catalá F., Belenguer Á., Caldach-Giner J., and Pérez-Sánchez J., 2023, Understanding how high stocking densities and concurrent limited oxygen availability drive social cohesion and adaptive features in regulatory growth, antioxidant defense and lipid metabolism in farmed gilthead sea bream (*sparus aurata*), *Frontiers in Physiology*, 14: 1272267.
<https://doi.org/10.3389/fphys.2023.1272267>
- Hu W., Cao Y., Liu Q., Yuan C., and Hu Z., 2024, Effect of salinity on the physiological response and transcriptome of spotted seabass (*Lateolabrax maculatus*), *Marine Pollution Bulletin*, 203: 116432.
<https://doi.org/10.1016/j.marpolbul.2024.116432>
- Huang Z., Liu L., and Li Z., 2025, China's spotted sea bass aquaculture: advances and further goals, *Reviews in Aquaculture*, 17(3): e70048.
<https://doi.org/10.1111/raq.70048>
- Jais N.A.M., Abdullah A.F., Kassim M.S.M., Karim M.M.A., M.A., and Muhadi N.A., 2024, Improved accuracy in iot-based water quality monitoring for aquaculture tanks using low-cost sensors: asian seabass fish farming, *Heliyon*, 10(8): e29022.
<https://doi.org/10.1016/j.heliyon.2024.e29022>
- Jia Z., Wang J., Liu X., Yan Z., Bai X., Zhou X., He X., and Hou J., 2022, Sediment diffusion is feasible to simultaneously reduce nitrate discharge from recirculating aquaculture system and ammonium release from sediments in receiving intensive aquaculture pond, *The Science of the Total Environment*, 858: 160017.
<https://doi.org/10.1016/j.scitotenv.2022.160017>
- Konnert G., Gerrits W., Gussekloo S., and Schrama J., 2022, Balancing protein and energy in nile tilapia feeds: a meta-analysis, *Reviews in Aquaculture*, 14(4): 1757-1778.
<https://doi.org/10.1111/raq.12671>
- Li W., Li D., Yang Q.H., Liu L., Liu J., Lu J., Wang Y., Tang R., Li L., and Zhang X., 2023, Long-term crowding stress induces chronic inflammatory response and declines the immunity of grass carp (*Ctenopharyngodon idella*), *Aquaculture*, 577: 739976.
<https://doi.org/10.1016/j.aquaculture.2023.739976>
- Lindholm-Lehto P., 2023, Water quality monitoring in recirculating aquaculture systems, *Aquaculture, Fish and Fisheries*, 3(2): 113-131.
<https://doi.org/10.1002/aff2.102>
- Lindholm-Lehto P., Pulkkinen J., Kiuru T., Koskela J., and Vielma J., 2021, Efficient water treatment achieved in recirculating aquaculture system using woodchip denitrification and slow sand filtration, *Environmental Science and Pollution Research*, 28(46): 65333-65348.
<https://doi.org/10.1007/s11356-021-15162-0>
- Lu K., Cai L., Wang L., Song K., Zhang C., and Rahimnejad S., 2020, Effects of dietary protein/energy ratio and water temperature on growth performance, digestive enzymes activity and non-specific immune response of spotted seabass (*Lateolabrax maculatus*), *Aquaculture Nutrition*, 26(6): 2023-2031.
<https://doi.org/10.1111/anu.13143>