



Latest Trends in Fisheries and Aquatic Animal Health Management

Sagar Gorakh Satkar^{1*}, Aitwar Vaijnath², Ediga Arun Goud³, Chavan Sachin²

¹Kerala University of Fisheries and Ocean Studies, Panangad, Kochi (Kerala)- 682506

²Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar, College of Fisheries, Mangaluru, Karnataka (575 002)

³Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, College of Fisheries, Shirgaon, Ratnagiri. Maharashtra (415 629)

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Abstract

Fisheries and aquatic animal health play a crucial role in global food security, economic development, and environmental sustainability. The possibility of disease in aquaculture is now significantly reduced as a consequence of advances in technology. Rapid immuno- and molecular diagnostics have been developed to identify diseases in fish, shellfish, and molluscs, in addition to their natural environment. As these approaches become more secure and widely utilized, their impact will increase.

Keywords: Fisheries, Aquatic Animal health, Modern technologies

Introduction

By 2025, annual demand for seafood will outstrip the capacity of wild fisheries by 55 million tons, according to estimations from the Food and Agriculture Organization of the United Nations (FAO, 2002). This represents a significant challenge to the aquaculture sector, but there is a lot of potential to satisfy this need through the use of modern technology to enhance aquatic species health and efficiency. Fisheries and aquatic animal health play a crucial role in global food security, economic development, and environmental sustainability. The possibility of disease in aquaculture is now significantly reduced as a consequence of advances in technology. Using immuno- and molecular diagnostics, several rapid approaches have been developed for determining the presence of infections in fish, shellfish, molluscs, and their environment. The latest trends in this field reflect advancements in technology, changes in consumer preferences, and a growing awareness of the importance of sustainable practices. Technologies that have significantly improved the health of aquatic animals. It will discuss recent/current technological advances and their contributions to disease risk reduction, with an emphasis on quick detection of pathogens and vaccine development.



Technological Advancements:

- a) **Rapid disease detection technologies to reducing risk of disease:** New technologies are being created to quickly identify infections and track host reactions. These methods include immunochromatography, such as lateral flow technology, and multiplex testing utilizing the Bio-Plex Protein Array System or microarray technologies. Lateral Flow is a straightforward approach that allows for precise and easy-to-use testing with high sensitivity and specificity. It involves just two stages and does not require any instruments, making it a cost-effective and time-saving option. The Protein Array device (Luminex) may potentially analyze up to 100 distinct biomolecules simultaneously from a single sample drop in a 96-well device. These approaches are in the early stages of development with limited published studies, mostly concentrating on the identification of cytokines.
- b) **Precision Aquaculture:** The integration of technology, such as sensors, IoT devices, and data analytics, has led to the development of precision aquaculture. This approach allows for real-time monitoring of water quality, feeding patterns, and health conditions, optimizing production efficiency and minimizing environmental impact.
- c) **Aquatic Drones:** The use of drones in fisheries has expanded for various purposes, including monitoring fish populations, detecting illegal fishing activities, and assessing the health of aquaculture facilities. Drones equipped with cameras and sensors provide valuable data for informed decision-making.

Sustainable Practices

a. Certification Programs: There is a growing emphasis on sustainability in fisheries, with an increase in certification programs such as the Marine Stewardship Council (MSC) and the Aquaculture Stewardship Council (ASC). Consumers are increasingly looking for eco-friendly labels when purchasing seafood products.

b. Circular Aquaculture: Circular economy principles are being applied to aquaculture to minimize waste and maximize resource efficiency. Recirculating aquaculture systems (RAS) and integrated multi-trophic aquaculture (IMTA) are gaining popularity, reducing the environmental impact of aquaculture operations.

Climate Change Resilience

a. Adaptation Strategies: Fisheries and aquaculture industries are developing strategies to cope with the impacts of climate change. This includes changes in fish migration patterns, altered water temperatures, and the spread of diseases. Adaptive management practices and the development of climate-resilient species are becoming more important.

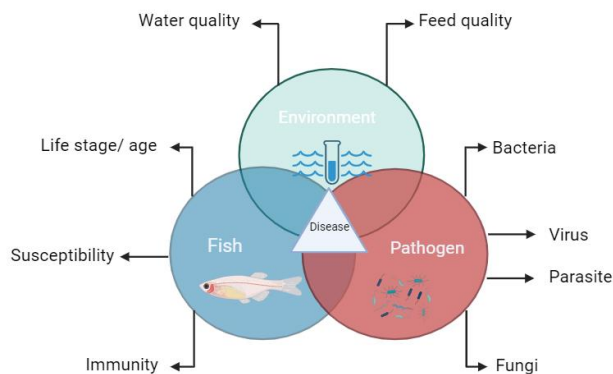


Aquatic Animal Health

a. Disease Prevention and Management: With the intensification of aquaculture, there is an increased focus on disease prevention and management. Probiotics, vaccines, and improved biosecurity measures are being employed to reduce the occurrence and spread of diseases in aquatic environments.

b. Genomic Tools: Advances in genomics are aiding researchers in understanding the genetic basis of disease resistance in aquatic species. This knowledge is crucial for selective breeding programs aimed at developing disease-resistant strains.

c. Vaccine technologies: Vaccination is the process by which a host organism is exposed to biological molecules to trigger a specific immune response, enhancing its ability to combat future infections from a particular pathogen compared to non-vaccinated hosts. It has been proven to be cost-effective and has resulted in decreased antibiotic usage. In Norway, antibiotic use has dropped from 47 to around one ton per year. There are several commercial vaccinations for bacterial and viral diseases, with many more vaccines currently being developed. Many people focus on catching salmon and trout, but there are also increasing chances to fish for marine species



Global Collaboration

a. International Cooperation: Given the interconnected nature of fisheries and aquaculture, there is a growing emphasis on international collaboration. Sharing knowledge, best practices, and technologies across borders are essential for addressing common challenges and ensuring the sustainability of global aquatic resources.

Challenges and Future Outlook

a. Illegal, Unreported, and Unregulated (IUU) Fishing: IUU fishing remains a significant challenge, threatening both the environment and the livelihoods of those dependent on fisheries. Strengthening enforcement mechanisms and international cooperation are crucial for combating IUU fishing.

b. Ethical Considerations: Ethical concerns, including issues related to labour practices in the fishing industry, are gaining attention. Sustainable practices should not only focus on environmental impact but also consider social and ethical dimensions.

Conclusion: The latest trends in fisheries and aquatic animal health reflect a dynamic and evolving industry. Embracing technology, promoting sustainability, and addressing global challenges through collaboration are essential for ensuring the long-term health of aquatic ecosystems and the well-being of communities dependent on fisheries. As the industry continues



to adapt to changing conditions, a holistic approach that balances economic, environmental, and social considerations will be key to success.

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