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Commentary

Major Role of Proteomics in Aquaculture Production and Analysis of Aquatic Animal Pathology

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DESCRIPTION

One of the major constraints in aquaculture production is the vulnerability of farmed fish to diseases caused by husbandry practises or external factors such as pollution, climate change, or even changes in the dynamic of product transactions in this industry. However, it is critical to better understand and characterise the intervenients in the process of a disease outbreak because these cause massive economic losses in aquaculture industries. High-throughput technologies, such as proteomics, can be an important characterization tool, particularly in pathogen identification and the virulence mechanisms associated with host-pathogen interactions on disease research and diagnostics, which will aid in the control, prevention, and treatment of diseases in farmed fish.

Proteomics plays an important role in understanding pathogenesis processes and fish responses to external factors such as stress or temperature, making it one of the most promising tools for fish pathology research. Proteomics is the next step in the study of biological systems after genomics and transcriptomics. It is more complicated than genomics because the genome of an organism is relatively constant, whereas proteomes vary from cell to cell and over time. Because different genes are expressed in different cell types, even the most basic set of proteins produced in a cell must be identified. RNA analysis was previously used to assess this phenomenon, but it was discovered to have no correlation with protein content. It is now understood that mRNA is not always translated into protein, and the amount of protein produced for a given amount of mRNA depends on the gene from which it is transcribed as well as the physiological state of the cell. Proteomics confirms the protein's presence and provides a direct measurement of its quantity.

Despite being the most consumed animal, fish are rarely treated with the same concern for their welfare as other vertebrates. When compared to other land animals produced for human consumption, scientific research on fish welfare is in its early stages. This lack of consideration is due in part, to the disparity between public perception of their intelligence and scientific evidence, as well as the lack of a unified definition of the concept. Nonetheless, most definitions take a feelings-based and function-based approach. Aquaculture is more concerned with the animal's biological, physiological, and health aspects, whereas good welfare is defined as the fish's ability to cope and adapt to its environment while maintaining homeostasis. Although the fish's health status provides objective criteria for determining welfare. Although good health is required to ensure good welfare, it does not always indicate that the fish is in a good welfare state. On the other hand, poor health, defined as the animal's reduced ability to function normally, cope with stressful situations, and prevent disease, generally implies/leads to a poor welfare status in a variety of contexts.

The study of aquatic animal pathology has gained global attention over time, and has increased in the last 25 years in tandem with the intensification of the aquatic production system and global climate change. Animal disease prevention, control, and eradication are all dependent on a thorough understanding of the diseases and their distribution. As a result, aquatic pathology can be regarded as an important multidisciplinary instrument, useful in many aquatic scientific fields such as marine ecology, aquaculture, and ecotoxicology, as well as in environmental monitoring programmes. As a result, the identification of fish and shellfish diseases and pathologies, along with a wide range of possible etiological agents, is increasingly being used as an indicator of environmental stress because they provide an ecologically relevant end-point of chemical exposure and can be used as biological models.

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