



Current Status of Fish Health and Immunity

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Abstract

The immune system is responsible for allowing humans to survive in an environment replete with potentially pathogenic microorganisms, many of them living on or within our bodies. The influence of nutrition and metabolism on immune function is a topic of rising interest, to the point that the new discipline of “immunometabolism” has arisen in order to foster a deep comprehension of this crucial relationship. Fish as a food is rich in compounds with immunoregulatory properties, among them omega-3 fatty acids, melatonin, tryptophan, taurine and polyamines. In addition, regular fish consumption favours the proliferation of beneficial members of the intestinal microbiota, like short-chain fatty acid-producing bacteria. Global aquaculture production has increased in recent years and it is predicted that aquaculture will provide the most reliable supply of seafood in the future. However, there are many controversial issues in aquaculture regarding food safety, nutrition, and sustainability; many of which are directly related to the nutrition and feeds for farmed fish. These nutrition-related issues must be considered in order to achieve balance in safe and nutritious food production and sustainability in aquaculture.

Keywords: Fish Immunity; Immune Response; Fish Disease

Introduction

This project highlights recent studies and discusses new and innovative aspects in fish nutrition (Health). Some issues in the area of fish nutrition require consideration and improvement, such as: feed and nutrient efficiency, overfeeding and waste, fish meal and fish oil replacements, fish health, biotechnology, and human health concern [1]. This project demonstrate promise toward improvement of the aquaculture industry through nutrition and update in fish nutrition research, and provides insight on the progression and evolution of this field in order to meet the needs of the industry with the purpose to achieve a balance in seafood production and environmental sustainability [2]. This mini review encourages the use of biotechnology as a tool to

meet seafood production and environmental sustainability, in order to ensure global food security in the future and to improve our resource use.

The environmental change influence over the oceans has been the subject of numerous articles informs and strategies from different scientific perspectives, focused mainly in the ecological impact. The majority of the related studies have been focused in measuring or predicting the physical, chemical, geographical, sociological and economic consequences of this reality, which seems to be unstoppable, and only a few of them are devoted to detect the effects of the climate change over the quality of fish food products, wild or cultivated. The stress produced in marine organisms by the consequences of climate change is reflected at the cell

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molecular level, being affected the metabolite concentration, the expression of proteins and their modifications. The study of the environmental change may take advantage of these molecular changes, which may be used as a source of possible biomarkers of its evolution [3]. After the genomic age, proteomics appears as a young but robust discipline for a global study of the protein content in cells, including their identification, possible modifications, quantification of differential expression and tissue localization, being the most adequate set of methodologies to evidence protein changes in marine organisms affected by climate variations [4,5]. Fish immunology is a key area of study for industrial applications in aquaculture. This is critically important on a global scale as 50% of the fish consumed world-wide are now produced by aquaculture, which capture fisheries peaked in production 20 years ago. Thus understanding fish immunity is critical if we are to productively combat costly outbreaks of fish diseases. Phagocytosis is the process by which cells engulf some solid particles to form internal vesicles known as phagosomes. Phagocytosis is in fact a specific form of endocytosis involving the vesicular interiorization of particles. Phagocytosis is essentially a defensive reaction against infection and invasion of the body by foreign substances and, in the immune system, phagocytosis is a major mechanism used to remove pathogens and/or cell debris [6]. In this mini review to present understanding of fish immunity and to applications in aquaculture.

