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Aquaculture Advancement

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Abstract

The aquaculture industry significantly contributed to reduce the hunger and malnutrition worldwide. FAO estimates to feed the world in 2050 must increase by over 60%. In this context FAO has conceptualized the Global Aquaculture Advancement Partnership (GAAP) Programme to prevent and combat the poverty, hunger and malnutrition and also to create a sustainable management and utilization of natural resources for the benefit of present and future generations. In this context it is good to keep in mind the welfare of farmed species, counteracting the development of the pathologies and studying and developing new diagnostic techniques and new vaccines. Rapid detection of pathogens is useful to prevent economic losses for farmers. We can mention: immunodiagnostics, molecular diagnostics and multiplex technologies, and also agglutination, fluorescent antibody methods, immunohistochemistry, enzyme linked immunosorbent assay and blot. In addition the prevention and the development of vaccines are necessary to control fish diseases and to limit antibiotic use in fish farming. A wide range of commercial vaccines is available against bacterial and viral pathogens and many new vaccines are under development i.e. recombinant technology. All these new technologies, both those for the prevention implemented thanks to vaccines that those that allow rapid detection of the pathogen, must be made available to all the so as to minimize losses for the farmers, to obtain an excellent product of quality and to make more sustainable and healthy this important resource.

Keywords: Aquaculture; Advances; Diagnostic Methods; Vaccine

Introduction

The aquaculture industry, in the last years, contributed significantly to reduce the hunger and malnutrition worldwide. FAO estimates to feed the world in 2050, agricultural output, originating from crops, livestock and fisheries, including aquaculture, must increase by over 60%. Fish contributes about 16% to the world's animal protein intake. Aquaculture now shares 47% of the global food fish supply, a 13% increase over the past decade. It continues to be the fastest growing food production sector in the world at nearly 6.5% a year. The increased population and expanding economies will exert a strong pressure on the world's aquatic ecosystems. Since people tend to consume more fish as their incomes grow, per capita fish consumption in many countries is expected to increase. Recent estimates indicate that an additional supply of nearly 50 million tonnes of fish will be required to feed the growing and increasingly affluent world population by 2030. To meet this demand aquaculture would have to grow 5.6% annually. Despite having achieved good progress in terms of expansion, intensification and diversification, global aquaculture has not grown evenly around the world. The Asia-Pacific region continues to dominate the aquaculture sector, with China alone contributing 62.3% of global production.

In this context FAO has conceptualized the Global Aquaculture Advancement Partnership (GAAP) Programme to prevent and combat the poverty, hunger and malnutrition and also to create a sustainable management and utilization of natural resources for the benefit of present and future generations. In this context it is good to keep in mind the welfare of farmed species, counteracting the development of the pathologies and studying and developing new diagnostic techniques and new vaccines.

Rapid detection of pathogens is useful in a variety of situations e.g., in clinically infected animals, in sub-clinically infected animals and in the environment. Although immunodiagnostics, molecular diagnostics [1,2] and multiplex technologies are all valuable rapid methods for the detection of pathogens in fish [3-5]. There are differences in sensitivities and specificities for each method and in the type of samples that can be used (e.g. formalin fixed, fresh, tissue, blood, water). It should also be noted that for many of the rapid methods live and dead pathogens cannot be distinguished, therefore, the inclusion of enrichment methods and the use of live/dead kits are useful supplementary methods [6]. A large number of methods have been developed for immunodiagnostics and these are used routinely in many laboratories for the detection of fish and shellfish pathogens.

Such methods include agglutination (slide/latex), fluorescent antibody test (FAT/IFAT) [7] immunohistochemistry (IHC), enzyme linked immunosorbent assay (ELISA) [8], and blot (dot-blot/dip-stick/western blot) [9].

In addition, the prevention using the vvaccination has proven to be the best way to control fish diseases and the use of vaccines in aquaculture is an important measure to reduce economic losses and to limit antibiotic use in fish farming [10].

A wide range of commercial vaccines is available against bacterial and viral pathogens and many new vaccines are under development. Most target salmon and trout and there are expanding opportunities in marine fish [11].

New methodologies based on genome information i.e. recombinant technology, are independent of the abundance of the antigens and immunogenicity during infection, and are useful tools for the identification of promising targets for recombinant subunit vaccine development [12] like as the revers technology approach used for the development of new vaccines [13].

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