

## Application of Probiotics in Aquaculture

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### Abstract

Aquaculture is one of the world's fastest growing industries, and Asia currently accounts for about 90 percent of global production. However, disease outbreaks in many countries in the Asia-Pacific region are restricted to the production of aquaculture, thereby affecting both the economic growth of the country and the socio-economic status of local citizens. Disease management in the aquaculture industry has been accomplished by using conventional techniques, synthetic chemicals and antibiotics in various ways. However, the use of such costly chemotherapeutants for disease control has been widely criticized for their negative effects, such as residue accumulation, development of drug resistance, immunosuppression and decreased consumer demand for antibiotic-treated aqua products, and conventional methods are ineffective in large aquaculture systems to control new diseases. Therefore, in order to preserve the health of the cultured species, alternative methods need to be established to maintain a stable microbial environment in the aquaculture systems. One of these approaches is the use of probiotics, which is gaining popularity in the management of possible pathogens. This analysis summarizes the requirements for the selection, significance and future prospects of potential probiotics in the aquaculture industry.

### Introduction

Aquaculture has become a significant economic operation in the field of a number of countries. In large-scale manufacturing premises, where aquatic animals are subject to harsh environments, disease-related issues and environmental degradation also occur, leading to severe economic problems. During this time, the prevention and control of diseases led to the use of veterinary medicinal products has increased significantly in recent decades. However, given the extensive evidence of antimicrobial evolution between pathogenic bacteria, resistance, the usefulness of antimicrobial agents has been questioned as a preventive measure (Balcazar,2003). Globally, during an antibiotic period of just around 60 years length, antibiotic tones were dispersed throughout the biosphere. Out of the “18,000 tons of antibiotics developed annually for medical and agricultural purposes in the United States, 12,600 tons are used for non-therapeutic treatment of livestock” for growth promotion purposes (SCAN, 2003). “1600 t of antibiotics, representing approximately 30% of the overall use of antibiotics in farm animals, are similarly used for growth promotion purposes in the European Union and Switzerland” (SCAN, 2003). These quantities of antibiotics exert a very strong selection pressure on the resistance of bacteria adapted to this situation, primarily through the horizontal and promiscuous flow of genes of resistance (SCAN, 2003). Mechanisms of resistance can evolve in one of two ways: chromosomal mutation or plasmid acquisition. Chromosomal