

Probiotics and Prebiotics in Fish Feed: Enhancing Fish Health and Aquaculture Sustainability

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DESCRIPTION

The global demand for seafood is rising rapidly, making sustainable and efficient fish farming more important than ever. In response to growing concerns about environmental impact, disease management, and the nutritional quality of farmed fish, aquaculture has turned to probiotics and prebiotics as natural alternatives to improve fish health and overall productivity. These ingredients are gaining popularity in fish feed formulations for their potential to boost immune systems, enhance digestion, and reduce the need for antibiotics, ultimately contributing to a more sustainable and eco-friendly aquaculture industry.

Probiotics and prebiotics

Probiotics are live microorganisms that, when added to the fish's diet, provide health benefits by improving the balance of gut microbiota. In fish, as in humans, the gut microbiota plays an important role in digestion, immune function, and overall health. Probiotics help to establish a favorable microbial environment in the gastrointestinal tract, aiding in nutrient absorption and protecting against harmful pathogens. Prebiotics, on the other hand, are non-digestible food ingredients that promote the growth or activity of beneficial microorganisms in the gut. Unlike probiotics, which are live bacteria, prebiotics serve as a food source for good bacteria, enhancing the effects of probiotics by fostering a healthy microbiome. Common prebiotics include fibers such as inulin, fructooligosaccharides and mannan oligosaccharides are found in plant-based materials.

Benefits of probiotics and prebiotics in fish feed

Improved gut health and digestion: The primary benefit of adding probiotics and prebiotics to fish feed is the improvement of digestive health. Farmed fish often live in crowded, high-stress environments that can disrupt their gut microbiota and lead to digestive issues. Probiotics help to restore the balance of beneficial bacteria, aiding in digestion and nutrient absorption.

In turn, this Enhances Feed Conversion efficiency (FCE), meaning fish are able to grow more effectively with less feed. Prebiotics act synergistically with probiotics, providing an additional food source for beneficial bacteria and enhancing their activity in the gut. This combination promotes a healthier digestive system, ensuring that fish can efficiently utilize the nutrients in their feed.

Enhanced immune function: Probiotics and prebiotics also play an important role in boosting the immune system of farmed fish. A healthy gut microbiota is essential for optimal immune function, as the gut is a key barrier against pathogenic organisms. By supporting beneficial microorganisms, probiotics and prebiotics can help strengthen the fish's natural defenses, making them less susceptible to infections and diseases. Several studies have shown that fish fed with probiotics and prebiotics have better resistance to pathogens like *vibrio*, *aeromonas*, and *lactobacillus*. This reduces the need for antibiotics and other chemicals, contributing to healthier fish and minimizing the risk of antibiotic resistance in aquaculture systems.

Reduction in environmental impact: By improving fish health and reducing disease outbreaks, the use of probiotics and prebiotics can also help reduce the environmental impact of aquaculture. Healthier fish require less medication, reducing the risk of chemical contaminants in the environment. Additionally, probiotics and prebiotics can enhance the efficiency of nutrient absorption, which reduces the amount of feed waste and organic matter released into the water, thereby lowering the risk of water pollution.

Alternative to antibiotics: One of the most significant benefits of probiotics and prebiotics is their role in reducing the need for antibiotics. Overuse of antibiotics in aquaculture is a major concern, as it can lead to the development of antibiotic-resistant bacteria that pose risks to both human health and marine ecosystems. By promoting gut health and immune function, probiotics and prebiotics reduce the need for antibiotics, contributing to the development of a more sustainable and responsible aquaculture industry.

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Applications in aquaculture

Probiotics and prebiotics are increasingly being incorporated into commercial fish feeds, particularly for species like salmon, tilapia, shrimp, and carp. These additives can be delivered in various forms, such as microencapsulated probiotics, which protect the bacteria from harsh conditions in the digestive tract, or as prebiotic fibers that are easily incorporated into the feed. The choice of probiotic strains and prebiotic ingredients depends on the species of fish being farmed and the specific goals of the feed formulation. Additionally, the effectiveness of probiotics and prebiotics can vary based on factors such as water temperature, fish species, and feed composition, making it essential to tailor feed formulations for optimal results.

CONCLUSION

The incorporation of probiotics and prebiotics into fish feed offers a natural, sustainable approach to improving fish health, enhancing feed efficiency, and reducing the environmental footprint of aquaculture. By promoting better digestion, boosting immunity, and reducing the need for antibiotics, these additives have the potential to significantly improve the sustainability and productivity of fish farming. As research continues to uncover new benefits and refine feed formulations, probiotics and prebiotics are likely to play an increasingly important role in the future of aquaculture. The industry's ability to adapt these natural solutions will help ensure that fish farming remains a reliable and eco-friendly source of protein for a growing global population.