



Full length article

Effect of dietary prebiotics and probiotics on snakehead (*Channa striata*) health: Haematology and disease resistance parameters against *Aeromonas hydrophila*



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ABSTRACT

This study examined the effect of dietary prebiotics and probiotics after 16 weeks, followed by 8 weeks of post feeding trial with the control unsupplemented diet on haematological and immune response against *Aeromonas hydrophila* infection in *Channa striata* fingerlings. Fish were raised on a 40% protein and 12% lipid feed containing three commercial prebiotics (β -glucan, GOS or galacto-oligosaccharide, MOS or mannan-oligosaccharide); and two probiotics- (*Saccharomyces cerevisiae*, *Lactobacillus acidophilus*), respectively and a control. Throughout the study, supplementation with dietary prebiotics and probiotics led to significant ($P < 0.05$) improvement in the red blood cells, white blood cells, packed cell volume, haemoglobin concentration and serum protein level and lysozyme activities; and these improvements were effective significantly ($P < 0.05$) when the fish were challenged with *Aeromonas hydrophila* at the dose of 2×10^6 . The disease resistance against *A. hydrophila* was higher significantly ($P < 0.05$) in fish fed with probiotic feed supplements (*L. acidophilus* was highest) compared to prebiotics and control. The study is the first to report the absence of differences in sustaining the efficacies attained after intake of β -glucan, GOS and MOS upon post-feeding with an unsupplemented feed, over a prolonged period.

1. Introduction

The increasing intensification and commercialization of aquaculture systems has accelerated the outbreak of diseases that are responsible for huge fish losses [8]. Intensified aquaculture of the Asian snakehead, *Channa striata* [7] is faced with similar problems associated with the deterioration of water quality and diseases outbreak [17,20,47]. The bottom-living habitat of snakehead exacerbates the situation since the bottom region boggy water [45] zone carries 10–20 time higher bacterial population compared to the other water column [31]. *Aeromonas hydrophila* is an opportunistic pathogenic bacteria thrives in this habitat and produces endotoxins and haemolysins [39] and [38,40] causing epizootic ulcerative syndrome (EUS) culminating in severe ulcerations and mortality [45]. The fish diseases of *C. striata* are usually managed using antibiotics (like other fish species) which have led to antimicrobial resistant pathogens, reduction in beneficial microbiota in the gastrointestinal (GI) ecosystem, including the accumulation of residual

antibiotics in fish muscle making it unsuitable for human consumption. Further, these treatments are not suitable for the management of parental disease [24,47] except as nutritional therapy. Supplementation of dietary prebiotics [23] and probiotics [22] with fish diet might be a potential nutritional therapy that are used as alternatives [16] to overcome the problems associated with antibiotics. Among the positive effects of these supplements are the enhancement of growth performance, high nutrient protein digestibility, high digestive enzymes activities and high expression of immune regulatory genes [33]. Both supplements have led to direct beneficial effects of the hosts in terms of growth by improving intestinal microbial balance [2,18]. Dietary prebiotics and probiotics has also been shown to enhance the quality of the haematological and immunological blood parameters of snakehead [51]. To date, there is no information on the duration of effectiveness of prebiotics and probiotics for a period of post-feeding without any supplementation. Hence this study evaluated directly the influence of pre- and probiotic feed supplements on blood and immunological

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