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Evaluating the effects of low molecular weight sodium alginate as an immunostimulator, also as a novel prebiotic combined with Bactocell® (a probiotic) on humoral and mucosal immune responses of Asian seabass (*Lates calcalifer*) juveniles

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During the past decade, aquaculture has been considered as one of the fastest-growing industries of food production. The elevation of aquatic animal production has been obtained by increasing the production per unit of area which per se results from intensification. However, the elevation of stocking density in aquaculture practices increases the stress level in the cultured organism and the risk of diseases. Following the 2006 EU ban on antimicrobial growth promoters, to reduce use of antibiotics chemical compounds in agri-business products have arisen. Therefore, application of bioactive substances, such as probiotics and prebiotics as an alternative to antibiotics has been considered as environmentally friendly tool for aquaculture. Interest in the use of prebiotics and probiotics in aquaculture increased considerably over the past several years due to the beneficial effects reported for these diet additives in humans and terrestrial animals, including enhanced production efficiency, increased nutrient utilization, and improved disease resistance. Using immune stimulants as bio-friendly and environmentally safe agents is an alternative approach to combat diseases in aquaculture. Therefore, present study performed to evaluate the potential effect of individual or combined administration of dietary low molecular weight sodium alginate (LMWSA) and Bactocell® on haematological, humoral and skin mucosal immune responses of *L. calcalifer* juveniles.

Methodology and Theoretical Orientation: In this study six weeks of feeding trial was conducted to examine the effect of dietary administration of low molecular weight sodium alginate (LMWSA) and *Pediococcus acidilactici* MA 18/5M (PA) on growth performance, digestive enzymes, and intestinal histology of *Lates calcalifer* juveniles. Fish (12.0 ± 0.2 g) were fed experimental diets as follows: Control (diet 1, basal diet), 5 g kg⁻¹ LMWSA (diet 2), 10 g kg⁻¹ LMWSA (diet 3), 0.9×10^7 CFU g⁻¹ PA (diet 4), 5 g kg⁻¹ LMWSA + 0.9×10^7 CFU g⁻¹ PA (Diet 5), and 10 g kg⁻¹ LMWSA + 0.9×10^7 CFU g⁻¹ PA (Diet 6). At the end of the trial, blood samples from the caudal vein and skin mucus were collected for evaluation of immunological parameters.

Findings: Results indicated a significant ($P < 0.05$) increase in innate immune parameters including serum lysozyme, bactericidal, hemolytic and respiratory burst activities as well as mucosal immune responses including lysozyme and bactericidal activities when diet was supplemented with immunostimulants. Moreover, the combined effects of LMWSA with Bactocell® resulted in more pronounced immunological responses compared to the control and singular administration. Red and white blood cell counts significantly increased with either singular or combined administration of LMWSA and Bactocell® compared with the control group ($P < 0.05$).

Conclusion and Significance: These results indicated that combined administration of LMWSA and Bactocell® can be considered as a beneficial feed additive and immunostimulant in *L. calcalifer* juveniles.

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