Reduced inflammatory response to Aeromonas hydrophila infection in sea bass (Dicentrarchus labrax) fed with beta-glucan supplements.

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INTRODUCTION:
Aquatic microorganisms develop antibiotic resistance, so the use of antibiotics against pathogens in aquaculture is banned in Europe and in USA. The solutions are new alternatives such as diet-supplemented of immunostimulants [1].

Immunostimulants (IS) enhance the immune response by increasing innate mechanisms and stimulating phagocytic activity of macrophages [2][3]. There are some suitable IS for aquaculture such as β-glucans that improve immune status controlling diseases in fish culture [4].

β-glucans derived from different sources have differences in their structure and on their activity [5].

Larger molecular weight β-glucans actuated leukocytes stimulating their phagocytic, cytotoxic and antimicrobial activities.

Low molecular weight β-glucans act as cellular effectors.

IN THE EXPERIMENT we carried out an investigation about β-glucans effects in sea bass (Dicentrarchus labrax) fed with 4 diets.

Condition A
Condition B
Condition C
Condition D

Fish were infected with Aeromonas hydrophila by an intraperitoneal injection to observe the immune response. This bacterium-infection is a common disease in cultured fish [6].

RESULTS:

HEAD-KIDNEY:
Site of hematopoiesis that contains phagocytic cells.

GILLS:
Is in contact with the external environment and is one of the primary routes of entry for infectious agents.

SPLAEN:
The biggest secondary lymphoid organ and numerous leukocytes are likely to produce cytokines.

REFERENCE:
5. Azran et al. 2007. 43(5): 597 – 606

MATERIALS AND METHODS:

CONDITIONS:

Rearing period: 1.6 m³ rectangular tanks at a density of 30 kg of fish per tank. Photothermal conditions remained constant (23-24°C, 10L: 8D) and dissolved oxygen level were kept over 7 ppm. Fish were fed once a day with a commercial pellet food (Skretting®).

After-rearing process: 144 distributed in 12 rectangular tanks (0.1 m³). Temperature oscillated between 21.6°C to 23.5°C. Oxygen level was maintained above 7 mg.L-1. Ammonia ranged between 0.043 to 0.25 mg.L-1. Nitrite were between 0.041 to 0.158 mg.L-1 and nitrate fluctuated between 18.9 and 40.5 mg.L-1.

Challenge experiment: All fishes from the diet experiment were distributed in 6 new tanks (1.6 m³). In these tanks were performed the infection by intraperitoneal injection with A. hydrophila.

DIET EXPERIMENT

4 different samples per tank between 19 days.

CONDITIONS:

β-glucans are an increase in the gene expression of:
• TNF-α: induces the inflammatory response
• IL-1β: increases the gene expression of inflammatory cytokine that regulates the immune response.

β-glucans are a significant change in gene expression:
• COX-2: mediates inflammatory processes.
• IL-10: improves the regulation in the inflammatory response, promoting the production of antibodies and the inhibition of macrophages.

REFERENCES:
5. Azran et al. 2007. 43(5): 597 – 606

CONCLUSIONS:

The initial hypothesis is not fulfilled. We had some significant results but we hoped to obtain more. We have to reconsider:
• The level of β-glucans in every dose of Macrogard®
• The time of the feeding treatment.

The final results can not confirm that the diet supplemented with β-glucans enhance the innate immune response of sea bass. We could further analyze the experiment with different doses of β-glucans in the following experiments.