

# HUMORAL IMMUNOMODULATION OF THE GILTHEAD SEABREAM (*SPARUS AURATA* L.) SUBJECTED TO LONG-TERM CROWDING STRESS

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## ABSTRACT

The welfare of farmed fish is influenced by management factors (stocking density, grading procedures, transport, feeding, water quality and prophylactic treatment), and stress in fish has been traditionally evaluated by behavioural, anatomical and physiological measurements. However, skin mucus has received less attention about its response of the fish surface after different stress stimuli, despite being the production or release of mucus the first response to stress in teleost's fish. Thus, the aim of this study was to compare some immune parameters on serum and skin mucus of gilthead seabream (*Sparus aurata*) specimens after long-term crowding stress. Fish were subjected to 10 kg m<sup>-3</sup> (low density, control group) and 50 kg m<sup>-3</sup> (high density as crowding group) during 2, 24 and 48 h. Then, IgM levels, peroxidase, protease and antiprotease activities were evaluated in serum and skin mucus samples. Ours results demonstrated that the IgM levels and peroxidase activity in the serum samples decreased and increased in a statistically significant way after 24 and 48 h of trial, respectively. However, protease and antiprotease activity did not show any significant variations among the different experimental groups. In the case of skin mucus, IgM levels and antiprotease activity did not show any significant variations between the experimental groups. However, peroxidase activity showed a significant increase after 48 h of trial respect to values found in control fish. In addition, protease activity evidenced a decreased and increase after 2 and 24 hours, respectively. Therefore, peroxidase and protease activities in skin mucus could be used as possible stress bioindicators in fish. This study represents an advance on our knowledge about the interaction between stress and skin mucosal immunity in fish. Further investigations are needed in the

evaluation of stress bioindicators in skin mucus of fish subject to other stressor situations and their possible use as simple, fast, non-invasive and relatively inexpensive technique in intensive aquaculture systems.

#### **KEYWORDS**

Stress, serum, skin mucus, gilthead seabream (*Sparus aurata* L.), teleosts.

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