Adaptive responses to high environmental ammonia in European sea bass acclimated to different salinities

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The European sea bass (*Dicentrarchus labrax*) is increasingly the most important marine species in European aquaculture, owing to increased farming of the marine fish, especially in the Mediterranean region. European sea bass belong to the euryhaline species of fish, which implies that they are capable of living in environments of wide range salinity. Farmers in the Mediterranean region are rearing the fish in sea cages and land-based systems, which greatly augment ammonia buildup. This experimental study will seek to establish the adaptability of the fish to High Environmental Ammonia (HEA), at different ambient salinities.

The researchers will expose European sea bass acclimated to HEA (20mg.l^{-1}), and feed at up to 2% of body weight, to different salinities ($32^{0}/_{00}$, $20^{0}/_{00}$, $10^{0}/_{00}$ and $2.5^{0}/_{00}$) in different experimental tanks. The adaptations of the fish in the experimental tanks will be observed after 0h (control) 12h, 48h, 84h and 180h intervals. Additionally, ammonia excretion rate and ammonia quotient (AQ) will be taken at each interval to help draw conclusions about the fish's adaptive responses to different ambient salinities. After each interval, fish will be removed from the tank and blood drawn from them for serology. At the end of the experiment, the fishes will be dissected and liver, brain, white muscle, gill and kidney tissues obtained for analysis. Analysis will involve measuring of plasma and muscle ammonia accumulation, plasma lactate, liver and muscle glycogen, cortisol and energy budget, AQ and Lipid and protein content. It is expected that fish would suffer marked disturbance of normal functions following prolonged exposure to HEA. Additionally, it is expected that ammonia excretion by the fish would increase in an attempt to maintain the positive ammonia gradient. However, the levels of ammonia in plasma and muscles, lactate accumulation in muscles and the ammonia quotient are expected to markedly increase. The extent to which these changes are observed will depend on salinity, since feeding is universal. High salinity environments have been shown to augment ammonia toxicity because it facilitates increased concentration of the NH_3 moiety, which is solely responsible for ammonia toxicity, in aqueous ammonia. As such, these changes, and even loss of function, will be expected to be more severe in fish exposed to higher salinities.