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Adaptive strategies of European sea bass (Dicentrarchus labrax) to ocean acidification and salinity stress

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Atmospheric carbon dioxide (CO_2) concentrations have been increasing since the beginning of the industrial revolution due to combustion of fossils fuel and other anthropogenic means. A number of scenarios assembled by the International Panel on Climate Change (IPCC) predict a rise from today's 380 µatm in atmospheric CO_2 concentrations to approximately 900 µatm until the year 2100 and a further rise of up to 1900 µatm by the year 2300. A rise in atmospheric CO_2 results in more dissolution in ocean surface water which eventually tends to increase CO_2 partial pressure. This scenario is anticipated to change seawater chemistry including decrease in pH often referred as Ocean acidification. This increase in ambient acidity is considered a potential threat to the ecosystem and can affect general physiology of fish as well as other calcareous organism. In addition, salinity stress is one of the prime factors influencing the performance of fish, and is anticipated to occur simultaneously with the event of ocean acidification. Therefore, to understand the interactive impact of these two environmental abiotic stresses (pCO_2 ranging from 380 µ;atm to 1900 µ;atm, and salinity gradients of 32ppt to 2.5ppt) on the ecophysiologal performance of fish, we investigated various biological adaptive response in European sea bass (Dicentrarchus labrax), a model estuarine teleost. Overall, we hypothesize that effect of ocean acidification would be exacerbate with shift in ambient salinity. Oxygen consumption, ammonia metabolism, iono-osmoregulation, energy budget, ion-regulatory enzymes, hormones and pH amendments in plasma were assayed as the potential indices of compensatory responses.

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Poster Session - Thursday 2nd July 2015