

## Effect of chronic exposure to ammonia on growth, food utilisation and metabolism of the European sea bass (



The chronic effects of exposing sea bass (average initial weight 100 g) to ammonia in water at 22 °C were first evaluated over a 61-day period (period 1, P1) during which nine different groups were submitted to nine ambient ammonia levels ranging from 0.014 to 0.493 mg l<sup>-1</sup> NH<sub>3</sub>-N (0.53–16.11 mg l<sup>-1</sup> total ammonia nitrogen (TA-N)) and fed using self-feeders. At the end of P1, the fish were starved for 10 days (P2). Their recovery capacity was tested over 43 days (P3) after which the exogenous ammonia supply was stopped in all treatments and the fish were allowed to feed. After 20 days of exposure a highly significant effect of ammonia was evident from the decrease in feeding activity, voluntary feed intake (VFI) and specific growth rate (SGR), and the increase in the feed conversion ratio (FCR). Ammonia exposure had no effect on circadian feeding rhythm or hourly actuation profiles. At the end of P1, the fish seemed to have adapted to all ambient ammonia concentrations tested since feeding and growth parameters were independent of ammonia levels. But they were unable to compensate for growth losses. Physiological adjustments

were observed: plasma TA-N concentrations were positively related to ambient TA-N while there was no major disturbance in plasma urea. Plasma tri-iodo-thyronine concentrations were affected by ambient ammonia concentrations and there were no significant changes in hydromineral balance. During P2, oxygen consumption and urea excretion did appear to have been affected by ambient ammonia. When the exogenous supply of ammonia was stopped (P3), fish exhibited hyperphagia and compensatory growth. In fish previously exposed to the highest ammonia levels, SGR and VFI were highest, and their FCR was improved. At the end of the experiment the final average weights were similar in all of the treatments (range 337–396 g). Depending on the concentrations used, ammonia exposure may enhance subsequent fish appetite and growth rate and have a similar effect on growth performances as restricting feeding level. Within the range tested, no detrimental effect of ammonia on the metabolic capacity of the fish, measured by oxygen consumption and urea excretion, or on their physiological status was recorded, and the fish had a good recovery capacity. In the conditions of the experiment, the non-observable effect concentration (NOEC) was 6 mg l<sup>-1</sup>.

**Auteurs du document :** Antoine Dosdat, Jeanine Person-Le Ruyet, Denis Covès, Gilbert Dutto, Eric Gasset, Annick Le Roux, Gilles Lemarié

**Obtenir le document :** EDP Sciences

**Mots clés :** Ammonia, Chronic toxicity, Compensatory growth, Self feeding, Sea bass

**Date :** 2003-12-15

**Format :** text/xml

**Source :** <https://doi.org/10.1016/j.aquliv.2003.08.001>

**Langue :** Anglais

**Télécharger les documents :** <https://www.alr-journal.org/10.1016/j.aquliv.2003.08.001/pdf>

**Permalien :** <https://www.documentation.eauetbiodiversite.fr/notice/effect-of-chronic-exposure-to-ammonia-on-growth-food-utilisation-and-metabolism-of-the-european-sea-0>

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