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Stocking density limits for post-smolt Atlantic salmon (*Salmo salar* L.) in semi-closed sea systems

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For the development of commercial scale semi-closed sea systems for post-smolt Atlantic salmon, further knowledge is required on the biological limits for fish density. In this experiment post-smolts were stocked in 5 different densities (25, 50, 75, 100 and 125 kg/m³) for 8 weeks in 10°C seawater. Water quality parameters such as oxygen, pH, CO₂ and TAN were monitored and kept within recommended values. The biomass in each tank was weighed every second week and increases in biomass were removed to maintain original treatment density throughout the experiment. Over the 8 week period the specific growth rate (SGR) of the biomass was reduced in densities above 75 kg/m³, furthermore when densities were increased from 100 kg/m³ to 125 kg/m³ growth rate decreased by 47%, along with a reduction in feed utilization. The effect of stocking density on post-smolt welfare was determined by studying the overall stress response and by examining external morphological welfare indicators. After 8 weeks primary and secondary stress responses such as elevated plasma levels of cortisol, blood sodium, PCO₂ and decreased blood pH were observed in the highest stocking density. Fish densities above 75 kg/m³ also increased pelvic fin damage and the prevalence of cataracts. In conclusion, this study suggests that stocking density should not exceed 75 kg/m³ in order to maintain optimal post-smolt performance and welfare. These results will have important implications for the design and development of commercial scale semi-closed sea systems.

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Importance of habitat characteristics on reproduction: The case study of the influence of nest size on Lusitanian toadfish's reproductive success

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Reproductive success on fishes is the main goal of fish farms. The profit of aquaculture companies relies on that. Thus, it is important to deepen the knowledge of the main factors that exert influence on reproduction. The habitat and its characteristics have a major influence on the reproductive cycle. To improve farming methods is essential to know the species preferences in terms of habitat. In species with paternal care as some teleost fishes, the quality of nests where they deposit the eggs is crucial for their fitness. In some species as the Lusitanian toadfish (*Halobatrachus didactylus*) and the Sand goby (*Pomatoschistus minutus*) males tend to choose nest proportional to their own body size and the area of the nest has a substantial contribution to the reproductive success of males, where owners of larger nests receive on average a higher number of eggs. Other species, for example the three-spine stickleback (*Gasterosteus aculeatus*) have been found to choose the larger nests or territories available in the absence of competition. Nest size is thus a key factor on male's reproductive success of many species; however in the Lusitanian toadfish (*H. didactylus*) the choice for nest size depends on a compromise between costs and benefits.

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