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# *A review of factors affecting the welfare of Atlantic salmon (*Salmo salar*)*

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## Abstract

*In the expanding salmon industry, many farmers use production methods that could result in poor welfare of the fish at various points of their lifecycle. We have reviewed methods used for producing salmon for food with the aim of identifying and drawing attention to factors likely to affect farmed Atlantic salmon (*Salmo salar*) welfare. In addition to water conditions and high stocking density at sea, other issues are important for fish welfare. Handling and transport of salmon between fresh- and seawater phases and before slaughter can have severe negative effects and research should continue to seek improved methods. Stocking densities in fresh- or seawater have substantial effects on the welfare of salmon and a reduction in densities should be considered in order to reduce fin damage in particular. Currently used feeding systems result in starvation for some fish and fin damage for others, hence new systems should be developed. Some on-demand feeding systems improve welfare. All farmed fish should be stunned prior to slaughter, not left to die of asphyxia. Carbon dioxide and electrical stunning methods do not always stun salmon humanely. The widely used methods of percussive stunning, manual or automatic, must be precise to effectively stun large numbers of fish. Welfare outcome indicators, such as fin damage, morbidity and mortality rate, should be used in standards and laws relating to salmon welfare.*

**Keywords**: *animal welfare, aquaculture, Atlantic salmon, fish farming, stocking density, welfare outcome indicators*