

CONSUMER PERCEPTION AND SCIENTIFIC KNOWLEDGE OF STOCKING DENSITY IN ORGANIC AQUACULTURE

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As part of the EU project OrAqua, literature reviews of consumer's issues and welfare aspects related to organic aquaculture have been carried out. The objective of the study is to give scientific input to the regulations for organic aquaculture production. Of welfare issues, most factors are covered; husbandry; water quality; light and photoperiod, stocking density, transport, slaughter and veterinary treatment. This presentation will discuss the relations between current organic regulations from the EU, consumer's perception and scientific knowledge of stocking density in Atlantic salmon, trout, sea bass and sea bream. The stakeholder's opinions and interests, will also be presented here. Feedback from stakeholders were given on the topic stocking density at the first of three stakeholder events of the OrAqua project.

Sub optimal stocking density may influence fish welfare and their environment in a negative way. However, optimal density is dependent on a huge variety of factors, such as water quality, social interactions, fish to fish interaction and fish to housing interaction that can have an effect on many aspects of welfare (Ashley 2007). Depending on the type of rearing system and species, the recommendations range from 4 to more than 267 kg/m³ (Ellis et al., 2002). There are many publications dealing with the effects of and on stocking density on conventional aquaculture. However, for organic aquaculture there is very little knowledge. Since organic regulations put very strict limitations to the use of oxygenation in the production, the knowledge from conventional farming is hardly directly comparable to organic farming. Thus, new knowledge is needed on stocking density and welfare in organic farming.

The consumer perception of stocking density varies in relation to type of consumer and of their background. The differences in the perceptions also arise from the consumer demand of good animal welfare, and a subjective evaluation of optimal density. In a study, it was reported high willingness to pay for increased fish welfare during the production (Grimsrud et al., 2013; Olesen et al, 2010). However, looking into the case of farmed salmon it is suggested that even though consumers may be willing to pay more for organic products, the average consumer is not willing to sacrifice quality and appearance of the products for it (Olesen et al., 2010). In a survey done in the UK, France, Italy and Germany, consumers were asked to rank factors that they find important to define organic fish. In the survey, 24% ranked low stocking density as relevant for organic fish. For comparison, 56.1%, ranked natural living conditions as relevant for the definition of organic fish, and subsequently good water quality (48.1%) and good fish welfare (41.5%). The difference in ranking of welfare and stocking density is interesting in respect of the discussion of whether the consumers perceive stocking density as a welfare issue. Scientific knowledge suggests a relationship between welfare and density, but that low stocking density does not always lead to good fish welfare (Turnbull et al., 2008). Organic aquaculture is, to a high degree, influenced by ethical conviction among the consumers buying organic fish/food, and the organic regulations for fish welfare in the light of consumer demands, public opinions and scientific knowledge will be discussed.

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References

- Ashley P. 2007. Fish welfare: Current issues in aquaculture. *Applied Animal Behaviour Science* 104, 199-235
- Ellis T., North B., Scott AP., Bromage NR. Porter M., Gadd D. 2002. The relationships between stocking density and welfare in farmed rainbow trout. *Journal of Fish Biology* 61, 493-531.
- Grimsrud K.M., Nielsen, H.M., Navrud, S., Olesen, I. 2013. Households' willingness-to-pay for improved fish welfare in breeding programs for farmed Atlantic salmon. *Aquaculture*, 372, 19-27..
- Olesen I., Alfnes F., Rora M.B., Kolstad K. 2010. Eliciting consumers' willingness to pay for organic and welfare-labelled salmon in a non-hypothetical choice experiment. *Livestock Science*, 127(2-3), 218-226.
- Turnbull J., North B., Ellis T., Adams C., Bron J., MacIntyre C., Huntingford F., 2008. Stocking density and welfare of farmed salmonids. In: Branson, E. (Ed.), *Fish Welfare*.