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Published in:
5th NordicRAS Workshop on Recirculating Aquaculture Systems Berlin, Germany, 7-8 October 2019: Book of Abstracts

Publication date:
2019

Document Version
Publisher's PDF, also known as Version of record

The effect of different water sources on the potential H_2S-formation within RAS

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Abstract

In the last years, several of the serious incidents involving acute fish mortalities in recirculating aquaculture systems (RAS) for Atlantic salmon (*Salmo salar*), have been caused by hydrogen sulphide (H_2S). These incidents have mainly occurred in seawater systems, e.g. post-smolt production. H_2S is formed by sulphate-reducing bacteria which uses sulphate (SO_4^{2-}) and organic material under anaerobic conditions. Seawater contains 1000 times more SO_4^{2-} than freshwater, increasing the potential risk for H_2S production. However, using seawater is pivotal to avoid desmoltification and preparing salmon for seawater transfer. The project where this preliminary study is from, propose removing sulphate from seawater through membrane filtration as a measure for reducing fish mortalities caused by H_2S.

The aim of this preliminary study was to understand what microbial environments in RAS have the highest potential risk for H_2S-formation and to gain a better understanding of the dynamic between organic material and sulphate concentration for H_2S formation in RAS-water.

Three main environmental sources where H2S could potentially form in a commercial RAS were selected: sludge, biofilter elements and RAS-water. A small-scale batch experiment was conducted where each of these three potential sources were exposed to seawater and brackish RAS-water. The H_2S kinetics and production rate was measured for each test. The organic material was also measured in form of COD (chemical oxygen demand) and organic carbons as fatty acid. Anions such as NO^{3-} and SO_4^{2-} and other water quality parameters were assessed.

The results of this experiment are still under development and analysis. Therefore, the results will be presented at the 5th NordicRAS workshop.

Acknowledgements: This research was funded by Innovasjonsprosjekt i næringslivet-HAVBRUK2 program through the project “Sulphate removal by membrane filtration technology to reduce the risk of fish death due to H_2S formation in recirculating aquaculture systems (RAS) – Aquasulfat” (Project number: 296545).

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