

# Combining UV and micro filtration to manage microbial water quality in recirculating aqua culture systems

**de Jesus Gregersen, Kim João; Pedersen, Per Bovbjerg; Pedersen, Lars-Flemming; Liu, Dibo; Dalsgaard, Johanne**

*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

# Combining UV and micro filtration to manage microbial water quality in recirculating aqua culture systems

Kim João de Jesus Gregersen[1*], Per Bovbjerg Pedersen[1], Lars-Flemming Pedersen[1], Dibo Liu[1], Johanne Dalsgaard[1]

[1]DTU Aqua, Technical University of Denmark, Hirtshals, Denmark

**Abstract**

Recent studies have focused on micro particle build-up in recirculation aquaculture systems (RAS), and a correlation between micro particles and microbial activity has been shown. The lower size spectra of what is commonly referred as micro particles is presumably composed of free swimming bacteria and therefore, the use of micro filtration and UV targeting bacteria should result in a reduction in bacteria (both free-swimming and surface-attached) and an overall reduction in micro particles (including bacteria) present in the system.

This study evaluated how micro particle build-up and microbial activity are affected by UV irradiation and micro filtration. Using 12 identical pilot scale RAS stocked with rainbow trout (*Oncorhynchus mykiss*), a two-factor factorial experiment was carried out testing in triplicate systems the effect of systems with or without UV irradiation in combination with cartridge filtration (1 or 200 µm pore size) on selected water quality parameters. The trial ran for 13 weeks and showed that both main factors (UV and cartridge filtration) had significant effect on micro particle distribution and microbial activity in the systems.

By the end of the trial, UV treated systems were significantly lower in micro particle numbers, micro particle surface area, dissolved COD, and microbial activity compared to systems without UV and independently of cartridge filtration pore size. UV thus appeared to reduce micro particles largely by destroying bacteria. With respect to micro filtration, a 1 vs. 200 µm pore size significantly reduced the number of micro particles, micro particle volume, and micro particle surface area independently of UV treatment. This was accompanied by a significant reduction in particulate COD and microbial activity. Hence, cartridge filtration appeared to prevent a build-up of micro particle by directly removing bacteria and bacteria substrate.

In conclusion, the study demonstrated that combining UV and particle removal is a potential way of managing microbial water quality in RAS. Furthermore, the results seem to sustain that a large proportion of micro particles are in fact living bacteria.

Acknowledgements: The study was partly funded by the European Maritime and Fisheries Fund (EMFF) and the Danish Ministry of Food, Agriculture and Fisheries as part of project ”Vet-løsninger” (J.no. 33111-I-16-029).

*jdjg@aqua.dtu.dk