Micro particles and microbial activity in Danish recirculating rainbow trout (Oncorhynchus mykiss) farms

Increasing intensities of water reuse in recirculating aquaculture systems (RAS) lead to a build-up of micro particles (< 20 μm) in the water. This build-up may have consequences for other water quality parameters and for the fish. This baseline study was carried out to determine the variation in micro particle levels (numbers, volume and surface area) and accompanying bacterial activity in commercially operated outdoor RAS, as well as the effects of different components in the recirculation loop on micro particle dynamics. Water samples were obtained during spring 2017 from 7 Danish Model Trout Farms (MTFs) producing rainbow trout (Oncorhynchus mykiss) in a total of 20 separate RAS units. Micro particle numbers and size distribution, bacterial activity, and inorganic and organic nutrient concentrations were analysed. Micro particle numbers ranged between 6.0·10⁴ – 7.4·10⁵ ml⁻¹ and large variations were found between seemingly similarly operated RAS units within the same farm. There was a strong, positive correlation (p<0.001) between micro particle levels and bacterial activity in the systems. Although not significant, biofilters generally seemed to trap particles whereas drum filters seemed to reduce particle volume while increasing particle numbers and surface area. The study sustains that bacterial activity in RAS is strongly associated with fine particle loading, and demonstrates for the first time the overall magnitude and level of variation in particle levels and bacterial activity that exists in commercially operated MTFs.

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