ACTIVATED PARTICULATE ORGANIC MATTER AS A CARBON SOURCE FOR DENITRIFICATION IN RAS

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Sustainable aquaculture supplies fish products to market to meet the increasing need of fish and fish products in human diet and industry. Recirculating aquaculture systems (RAS), in which there is constant reuse of water, offer an extremely resource-efficient way to produce fish. Yet, RAS also need a constant water filtration in order to achieve adequate water parameters and finally quality products. Efforts to increase the effectiveness of the nitrification biofilters and denitrification reactors and to decrease the amount of solid waste in form of fish faeces and waste diet from a RAS are central research topics in this field. The present study aimed:

1) To analyze how efficiently fish use the inputs to the RAS system and the content of what is lost (e.g. in fish faeces, foam, waste diet etc) within waste products from a RAS,
2) To determine if filtered particulate organic matter, otherwise disposed of as waste, may be used as carbon source in a recycling procedure within RAS and,
3) To evaluate the effectiveness of ozone-activated particulate organic matter when used by denitrification bacteria as external carbon source.

An experiment was conducted in which individuals of European seabass *Dicentrarchus labrax,* kept in a RAS, were fed *ad libitum* with commercial feeds and the amount of solid waste (according to the feeds inputs) from the drum filter and the protein skimmer were determined, sampled before and after feeding and analyzed to examine their carbon, nitrogen and organic matter content (e.g. aminoacids, fatty acids) tested against the commercial feed used. Organic matter content was determined by gas chromatography and mass spectrometry. The sampled particulate organic matter from the drum filter was subsequently treated with ozone over various time intervals and its content analyzed to quantify simple carbon substrates feasible for use as carbon source by bacteria in the denitrification reactor. Ozone is commonly used for disinfection purpose and to clear the water from organic compounds responsible of the high turbidity of the water in RAS. It is as well toxic for living organism when higher levels leak to the system. The ozonized samples were tested against commercial carbon sources commonly used for RAS-denitrification at a laboratory scale with the aim of test it later on in a real system. The final objective is to evaluate the performance of denitrification reactors using ozone-activated particulate organic matter and to determine its influence on the growth performance of the studied species under these conditions as well as on the efficiency of the denitrification process. We expect to optimize RAS by recycling the particulate organic matter filtered out from the RAS and to find out the best ozone treatment time for obtaining an efficient denitrification and no collateral damage to the reared organisms or

to the bacteria in denitrification reactors and nitrification biofilters. Preliminary results of this pilot study will be presented.