Marine Model Trout Farms: developments in marine RAS

Economical and environmentally sustainable production of large salmonids in sea water has in Denmark been called for during some years. Based on the experience gained from the Danish Model Trout Farms in freshwater, a rather similar concept has been developed for farming of larger fish in sea water. This development and demonstration unit in commercial scale will during the next four years hopefully provide scientific and practical basis and support for further development in coming generations of Marine Model Trout Farms for large salmonids. The unit consist in the recirculation loop of one large fish tank, \( \varnothing 25 \text{ m}, \text{ depth } 4.5 \text{ m} \), i.e. tank volume some 2,000 m\(^3\); a drum filter (HydroTech); 9 separate pumps (Grundfos NB 150-200/224), 2 for each of 3 submerged biofilter-sections and 3 pumps bypassing the submerged biofilters, leading directly to the large trickling filter where the water from the submerged biofilters also enter. Each submerged biofilter contains 22.6 m\(^3\) filter elements (RK BioElements 750 m\(^2\)/m\(^3\); RK plast) and the trickling filters contains 90 m\(^3\) (BioBlock 200, Exponet). From the trickling filter water is led directly back to the fish tank. According to fish stock, feeding level and water temperature the pumps can be individually turned on/off primarily in relation to oxygen need and consumption in the fish tank. In a 1 year batch production some 20 t of fish will be introduced in April and some 80 t are supposed to be harvested in December. End-of-pipe treatment is a two-step process. First, nitrogen is removed in a full-scale experimental set-up where sludge from the drum filter is hydrolysed and the VFAs generated used as energy-source for the denitrification process in separate tanks/filters. Final polishing follows in a constructed wetland. For the first 2 years of operation production will be focussed on rainbow trout production, mimicking the typical Danish net cage farming cycle, where the cages are stocked with fish of 750 – 1,000 g in April/May and all harvested before Christmas weighing some 4 kg/pcs. During these two years important production parameters such as growth-rate, feed conversion and pigmentation will be compared to net-cage results and a full-cost comparison will be performed. After 2 years Atlantic salmon will be farmed in all-year operation. The project is supported by the Danish GUDP joint cooperation between research and industry, and the participants are: The North Sea Center (facilities); AquaPri (fish producer); Biomar (feed producer); Billund Aquaculture (system supplier); RK Plast (producer of biofilter elements) and DTU Aqua. Facts, Experience gained, facts and figures will be presented.