- Invited Paper -

A NEW WATER TREATMENT TECHNIQUE FOR A WATER REUSE FISH CULTURE SYSTEM WITH MINERAL PARTICLES AND A FOAM FRACTIONATOR

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Various water reuse techniques for land-based and facilitated fishculture systems have been studied and tried in diverse aspects as an answer to the impacts related with water resources, environment, energy requirements and disease control. The existing water reuse systems usually comprise the processes of settling, screening, biofiltering, degassing and disinfecting somewhat complicate and sophisticated in structure and management. A few systems equipped with the biofilters have been successfully operated in commercial scale. A new water treatment technique for water reuse fishculture system only with mineral particles and foam fractionator without biofilter etc. was tried to rear olive flounder, *Paralichthys olivaceus* and acquired a possibility of commercial application (B. S. Min et al., 2000). A subsequent pilot scale trial was accomplished for commercial adaptation of the system by the Korean government's financial support.

A set of alined five circular tanks of 7 m in diameter connected to a foam fractionater was installed, in which olive flounder was reared for one year from September 2001 to August 2002. Each tank of the set drains through a central stand pipe and an outer stand pipe to a ditch. At the end of the ditch the water is pumped up to the foam fractionator. A Ventri tube located at the end of the discharge pipe of the pump aspirates the air to make mixture of the water and the air in the foam fractionator. The supernatant foam separated from the mixture drains out of the foam fractionator and the water is distributed to the culture tanks through another ditch (Fig. 1).

The amount of the culture water is 15 m^3 for a tank with 0.4 m in depth. The turn over rate of the culture water is 4 times an hour (60 m^3 /hr/tank). The makeup water is 10 m^3 /hr. The mineral particles (Bentonite, Zeolite) were introduced directly into the culture tanks two times a day at 6 AM and 6 PM 400 g each time. Each tank was lighted at the center 1.5 m above the water surface by an incandescent bulb (100W) from 6 AM to 6 PM. The fish was fed on pellet diet 3 times a day under 40 g/fish, 2 times under 100 g/fish and once a day afterward. At the beginning 10,000 fish of 10 g/fish were stocked in each tank.

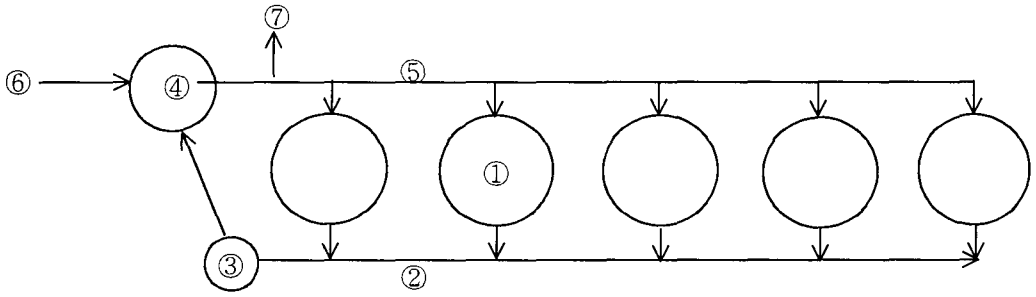

Fig. 1. Configuration of the set.

①: Culture tank; ②: Drain ditch; ③: Pump; ④: Foam fractionator; ⑤: Supply ditch;
⑥: Foam with the same amount of the makeup water income; ⑦: Makeup water.

The stocking biomass was maintained between 600 kg and 800 kg per tank.

The water temperature of the culture water was 9.2~25.3℃ and of the makeup water was 7.9~25.3℃. The ambient air temperature was 4.3~25.1℃. The dissolved oxygen of the culture water at the drain was 70~90% and of the makeup water at the outlet was 90~110% of saturation. The concentration of ammonia under 2 ㎎/ℓ was maintained at all check points of the system. The total consumption of the feed for one year was 7,090 ㎏. The total harvest of the fish was 5,243 ㎏. The total loss by diseases was 463 ㎏ and by jump out to die 58 ㎏. The resulting feed conversion rate was 1.23. Equipped only with a foam fractionator the new water reuse system is very simple in structure and maintenance comparing to the existing reuse system with biofilter. The new water reuse technique could be applied to the commercial fish culture facilities.