Standard Oral Presentation

A comparison of the health and performance of Chinook salmon reared in partial reuse circular tanks and flow-through raceways

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Modern partial reuse aquaculture systems have the capacity to reuse 80% of their water while maintaining water quality parameters (e.g. DO, CO_2, ammonia) within safe limits, and are therefore of interest to those who are investigating methods to reduce water usage. In order for partial reuse systems to be deemed acceptable as replacements to traditional flow-through rearing, fish health and welfare, among other things, should be comparable between the two system types, if not improved by partial reuse technology. However, limited observational research has been conducted in this area. The study presented here was conducted to investigate fish health and welfare between partial reuse and flow-through systems in a full-scale field setting.

A full-scale partial water reuse system was constructed at the Eastbank Hatchery (Wenatchee, WA) to rear approximately 120,000 Chinook salmon for a 5-month early rearing period (June 2008–November 2008) while the remainder of this population (60,000) was raised for the same period at Eastbank Hatchery in a traditional flow-through raceway. Our hypothesis was that fish will have comparable, if not improved, growth, health and welfare in the new partial reuse system relative to those in flow-through rearing units. The study followed a prospective cohort epidemiological design, and assessed specific health and welfare indicators between two cohorts of fish of the same background (genetic strain, early rearing environment, etc.) exposed to two different rearing systems, with all other exposures (water source, management, rearing densities, feeding rates, etc.) being equal. The methodology focused on three areas: performance, health, and welfare. For performance comparison, fish were sampled from both cohorts at regular monthly intervals for length and weight data to determine growth rate and feed conversion. For health comparison, samples of 60 fish from each cohort (120 fish total per sampling event) were collected at the start, middle, and end of the study period. Fish were screened for listed viral, bacterial, and parasitic pathogens, following USDA APHIS Blue Book protocols. At the end of the study, 50 fish from each cohort were assessed to determine the extent of organ pathology within each cohort. For welfare comparison, 50 fish from each cohort had their fin condition assessed at the end of the study.

Initial results indicate that the Chinook salmon reared in the partial reuse system have comparable growth, feed conversion, and health status as those Chinook salmon reared in the traditional flow-through raceway. Future detailed data analysis will show whether there were statistically significant differences over the study period between the two cohorts. Initial results show that partial water reuse is an acceptable and potentially preferred method of rearing these fish because of the many benefits that partial water reuse systems provide over traditional flow-through raceways. Partial water reuse systems use significantly less water than raceways while providing excellent water quality and a uniform rearing environment. Because these systems use less water, the wastes generated by the fish are concentrated in a smaller flow resulting in more effective treatment of the effluent. In this study the water flow used per kg of fish reared was 0.7 lpm/kg in the partial reuse system and 2.0 lpm/kg in the traditional raceway, a difference of 285%.