The Effect of Erythromycin Feed Treatments on Prevalence of Bacterial Kidney Disease and Survival of Spring Chinook Salmon at an Oregon Hatchery*

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Introduction
Bacterial kidney disease (BKD), caused by Renibacterium salmoninarum, most often results from a chronic, slowly progressing infection that can inflict serious losses in both hatchery-reared and wild salmon stocks. Spring Chinook salmon reared at Warm Springs National Fish Hatchery, Oregon are infected to varying extent with R. salmoninarum, and have been treated prophylactically with erythromycin in feed to reduce the prevalence and severity of R. salmoninarum infections at the hatchery. The purpose of this study was to determine the effects of oral erythromycin treatment on:

1) survival of juveniles in the hatchery
2) level of infection of juveniles in the hatchery as measured by ELISA
3) survival from release to adult return to the hatchery

Erythromycin treatment
Juvenile fish in brood years 1993-1997 were treated prophylactically with erythromycin (tetracycline (Aquamycin 100) at a rate of 100 mg/kg body weight in May and September for 21 to 28 days depending on brood year. Erythromycin was incorporated into the feed for the treated group, the control group received the same diet for the same number of days with no erythromycin. Unique coded wire tags were used to differentiate each brood year and study group. Mortalities were recorded for each raceway throughout the rearing cycle.

Release and adult returns
Fish from all study groups were released on-station usually in mid-April during their second year of growth (typical spring yearling release). Adult fish from each release were recovered back at the hatchery after spending one to three years in the Pacific Ocean.

Statistics of ELISA data
Optical densities are not normally distributed; therefore, data were transformed with the Box-Cox method (Ecological Methodology, Krebs, 1999) to minimize skewness between data groups within each brood year. Data for each brood year (3 time points and 2 treatment levels) were then analyzed with a General Linear Model and Tukey post-hoc tests, both of which are robust for departures from normality (Biostatistical Analysis, Zar, 1999).

Conclusions
1) Survival of juveniles at the hatchery
   a) was improved with erythromycin treatments if there was BKD
   b) was not predicted by ELISA results in juveniles
2) Differences in the level of infection of juveniles in the hatchery as measured by ELISA
   a) were detected in the control vs. treated groups only when there were high mortalities due to BKD
   b) were detected over time: OD's were higher at release in the control group.
3) Survival to adult
   a) was significantly higher in the treated group compared to the control group
   b) was not predicted by ELISA results in juveniles

There was a clear, consistent benefit to smolt to adult survival from using erythromycin medicated feed, although the ELISA data did not show a difference in levels of infection of Renibacterium salmoninarum at time of release.

*Poster presented at 2006 NW Fish Culture Conference, Portland, Oregon