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FISH PATHOLOGIST REPORT

Location

Iron Gate Hatchery

Date

October 13, 2009

Species

Fall-Run Chinook Yearlings

Ponds

Regular Feed- E series
Low Phosphorus feed- D series

Fish Health Assessment and Feed Trial Evaluation

This Health Assessment was conducted both to record over-all health condition of the November release fall-run Chinook yearlings and to evaluate differences between groups of fish fed regular (Nelson Silver Cup) or low-phosphorus (Bio-Oregon) feed since June 3, 2009 (~4.5 months). These fish were also examined briefly after the first few weeks of the feed trial (see Iron Gate Path Report, 9-3-9) at which time no significant differences were found among the two groups.

After the 9-3-9 Health Assessment and disease diagnostic, all raceways at the Hatchery were treated for pathogens with potassium permanganate flushes and oxytetracycline medicated feed. Losses remained chronic in D series (the Low Phosphorous (LP) group), while losses in all other series fell to background levels. In weeks immediately prior to today's final health assessment, losses in the LP group were still around 50 fish per day of 151K fish, or 0.03% per day (See Veek Path Report, 10-12-9).

Twenty fish from both groups were randomly selected and assessed for over-all health condition (samples for both groups were taken at same location in corresponding ponds). Two fish in the regular feed group had slight lesions on skin, while four fish in the LP group had lesions on skin and two in the LP group had eroded fins. All fish examined had seemingly perfect gills, eyes, pseudobranchs, thymus, gastrointestinal tracts (all fish had food in tract), kidneys, spleens and livers. For clarity, specifics on the two groups of fish are written separately below with any differences noted in summary.

Regular feed (Silver Cup, E series): The average weight was 32.0 grams and the average length was 149.2 mm. The average length-weight condition factor was 0.95 (see raw data on accompanying Excel spreadsheet). The average hematocrit (packed blood cell volume) was 50.05% (in acceptable range) and the average plasma protein concentration was 5.12 g/dL (also in acceptable range). Most fish scored a "1" on mesenteric fat, while a "2" would have indicated a bit more fat (a "0" would mean no fat, a "3" would mean excess fat). The average smolt index score was 0.8 indicating that the fish are readying for outmigration. The overall score was 0.1; a perfect score

is 0.0. These fish appear healthy, properly developed and should be ready for outmigration in early November.

Low-Phosphorus feed (Bio-Oregon, D series): The average weight of fish was 30.7 grams and the average length was 146.4 mm. The average length-weight condition factor was 0.95 (see raw data on accompanying Excel spreadsheet). The average hematocrit (packed blood cell volume) was 44.0% (in acceptable range, but very much on the low side) and the average plasma protein concentration was 4.4 g/dL (also in acceptable range, but approaching the low side). The average mesenteric fat score was 0.9, an average score of "2" indicates that the fish have more energy reserves. The average smolt index score was 0.75, indicating that these fish are readying for outmigration. The overall score was 0.35 while a perfect score is 0.0. The factors that brought the score down were the skin and fin defects. These fish appear healthy, but could be healthier with regards to fat reserves and the absence of infection. Four fish in this group had bands of leukocytes (measurable leucocrits) obvious to the naked eye, suggesting that these fish were fighting some type of infection at time of euthanization. The recommended medicated feed (Oct 12, 2009 Path Report) and a few more weeks of nutrition should foster additional development readying the fish for outmigration and help them to successfully overcoming the bacterial infection.

Noted Differences

There is a slight difference in average weight and length between fish fed regular and low-phosphorus diets (31.9 g and 149.2 mm vs. 30.7 g and 146.4 mm, respectively) with the regular diet fish slightly longer and heavier. However, these differences are not statistically significant. The hematocrit and plasma protein levels in the LP group were in acceptable range, but much lower than fish fed the regular diet (50.05% and 5.12 g/dL vs. 44% and 4.37 g/dL) which is concerning. Furthermore, the presence of visible bands of leukocytes strongly supports the fact that fish in the LP group are fighting pathogenic challenge where fish losses have been chronic and unacceptable.

Mortality Data

Besides fish production, perhaps the most important data on these Feed Trial groups is total mortality. For the LP feed, a total of 2,290 fish were lost, while less than half that many (1,065) were lost in the regular feed group. While other raceway series fed regular feed were not stocked with the exact same amount of fish, their total losses were 835, 514, 953 and 1,264.

Comments

Using only one experimental group for feed trials can be confounding, especially when issues such as chronic losses are observed. If two groups were used for the LP feed, and both series proved to have chronic losses, we would feel more confident in our observations, even without using statistical measures. However, since all raceways at the Hatchery were treated at the same time for the same pathogens, and the only group that did not improve was the LP group, it begs the question as to if the LP diet was contributing to poor fish health. Could the LP medicated feed have had an insufficient dose of Oxytetracycline? What other factors are playing role? Empirical observations from this study that are applicable to the hatchery setting suggest that

the LP feed did not perform as well as the regular type feed. Additional studies with more experimental groups and less extraneous variables could refute or support this conclusion.

Water temp is 47°F.

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