Genetic Selection For Improving Feed Utilization And Modification Of Fillet Quality

Ken Overturf, USDA-ARS, Hagerman Fish Culture Experiment Station, Hagerman, ID, U.S.A

Even though fish meal and fish oil have proven to be ideal protein and oil sources for aquaculture, as productioncontinues to grow the paucity of these fish derived products makes them less than ideal as protein and oil sources in aquaculture feeds.

Through genetic selection we have generated a strain of rainbow trout that grows well on anall plant-based diet containing high levels of soy protein. Utilizing our unique strain of selected rainbow trout, we have been able to distinguish differences in the physiology of non-selected trout versus selected trout when fed soy-based plant feeds with and without fish oil.

Most discernible is amino acid utilization, changes in pathogen resistance and development of intestinal enteritis in non-selected fish reared on these high soy feeds. Evaluation of transcriptomic, proteomic, histologic, and microbiota data generated from dietary comparative studies between selected and non-selected strains reveals distinct changes related to nutrient utilization and metabolism.

These changes are also reflective in microbiota colonization throughout the entire intestine. Correlative changes in gene and protein expression reveal some of the underlying regulation related to the phenotypic changes in regard to nutrient utilization and lipid deposition.

This work is partly presented at 2nd European Summit on Aquaculture, Fisheries and Horticulture, September 20-21 , 2018, Lisbon, Portugal