

8th International Conference on

FISHERIES & AQUACULTURE

October 02-04, 2017 Toronto, Canada



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Challenges to the development of new disease management tools/products for a growing aquaculture industry

Statement of the Problem: A new nickel with the global population expected to reach 9 billion by the year 2050, aquaculture will continue to expand and provide the majority of seafood products to meet world demand. Current and future expansion must be done in a sustainable and economically viable way. As new aquaculture ventures develop, disease management is often neglected due to a lack of appropriate tools/products to combat new and emerging diseases. There is a strong need for new and better products, but the challenges facing successful development and commercialization of vaccines or other disease control products are immense. Bacterial diseases are the most common problems in marine and freshwater aquaculture and in some cases vaccines are successfully used to prevent or control mortality. However, many operations rely on antibiotics to control diseases. To remain a viable and sustainable industry, alternatives to antibiotics must be further developed. Better vaccines aimed at preventing or limiting disease outbreaks are important, but other alternatives (e.g. functional feeds, probiotics, etc.) are being explored. Two such tools/products will be highlighted and discussed. Our group has developed and patented a live attenuated immersion vaccine that protects fish from bacterial Coldwater disease/rainbow trout fry syndrome (CWD/RTFS). This vaccine has been proven efficacious in fish as small as 0.5 g (Fig. 1) and all aspects of this vaccine are currently being optimized for commercialization. Another potential alternative tool to control this disease involves a putative probiotic (*Enterobacter* C6-6), which was recently discovered and shown to reduce mortality when fed to fish infected with *Flavobacterium psychrophilum*, the causative agent of CWD/RTFS. Interestingly, the mechanism associated with this bacteria's ability to inhibit *F. psychrophilum* *in vitro* and reduce mortality in rainbow trout *in vivo* appears to be linked to an antimicrobial peptide. The development, subsequent optimization, and potential path to commercialization of these fish health tools/products will be discussed.

Biography

Kenneth Cain does his research which primarily focuses on the fish immune system and developing new and improved aquaculture vaccines and other alternative disease management tools/products. This work has provided a greater understanding of the role mucosal immunity and antibody play in mucosal vaccines for fish. Efforts in his laboratory have led to the development of a live attenuated vaccine against Coldwater disease and rainbow trout fry syndrome for use in salmonid aquaculture. This vaccine is under commercial development. Furthermore, his lab has discovered a naturally occurring putative probiotic in the microbiota of rainbow trout capable of reducing mortality when applied to commercial feeds and fed to rainbow trout. These new disease management tools have the potential to provide significant production improvements for aquaculture.

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