A green alternative for treating Streptococcus iniae bacteria in hybrid striped bass

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Hybrid striped bass. Credit: Matt McEntire, ARS

Scientists at the United States Department of Agriculture (USDA)'s Agricultural Research Service (ARS) have developed a green antibiotic alternative to treat the deadly pathogen Streptococcus iniae in hybrid striped bass, the fourth-most farmed fin fish in the United States, according to a recent study.

The work is published in the journal *Fish & Shellfish Immunology*.

S. iniae is the causative agent of streptococcosis, a disease prevalent in aquaculture and causes a worldwide economic loss of $150 million annually. Disease outbreaks can bankrupt fish farms and put farmers at risk of getting the disease when handling infected fish.

Current vaccines provide only short-term protection for S. iniae, and fish farmers more often rely on antibiotics to treat the disease. The ARS scientists aimed to develop a natural treatment since antimicrobial resistance—a process when germs like bacteria and fungi develop the ability to fight drugs designed to kill them—is a major concern for aquaculture farmers when treating bacterial diseases.

"Together with collaborators, we developed a novel antimicrobial protein and treatment regimen, that specifically kills only Streptococcus bacteria, and does not leave any chemical residues in the environment," said Michael Deshotel, research microbiologist at the Harry K. Dupree Stuttgart National Aquaculture Research Center in Stuttgart, Arkansas. "According to our study's results, this protein effectively cures S. iniae infections in hybrid striped bass."

According to Deshotel, the protein, known as ClyX-2, showed a 95% survival rate for the fish in the treatment groups in comparison to the 5% survival rate of fish in the control groups during the study. The results showed that the protein was statistically as effective at treating S. iniae as antibiotic treatments like carbenicillin (85% cure rate).

In the future, Deshotel and the researchers plan to study how to treat water to prevent diseases caused by S. iniae before they can infect fish.

More information: Michael B. Deshotel et al, Bacteriophage endolysin treatment for systemic infection of Streptococcus iniae in

hybrid striped bass, *Fish & Shellfish Immunology* (2023). DOI: 10.1016/j.fsi.2023.109296

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