



REQUEST FOR PRE-PROPOSALS

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The USDA-NIFA Southern Regional Aquaculture Center solicits response from qualified multi-state teams interested in participating in the regional project:

EVALUATION OF PROBIOTICS IN FINFISH HATCHERIES TO IMPROVE LARVAL PRODUCTION

SRAC's Board of Directors has authorized up to \$250,000 for a 2-year project to improve larval production in finfish hatcheries through the evaluation of probiotics. This project will be developed using the "competitive proposal method" where a team of multi-state scientists having demonstrated records of expertise in the subject complete a single pre-proposal that addresses all project objectives. One proposal will be selected for funding based on review by a committee of scientists not involved in any of the proposals that are submitted.

Background

Probiotics are now commonly used in livestock production and aquaculture. Commercial feed additives have been used to improve survival, nutrient uptake, feed efficiency, oxygen utilization, and general animal health. However, finfish hatchery protocols that incorporate probiotics are poorly defined and not well researched for both freshwater and marine environments. Many commercially available options exist for hatchery production that may reduce mortality associated with bacteria such as *Vibrio* spp., improve early larval gut microbial colonization, and improve overall animal health and immune system function. These probiotic application points may include addition to the aquatic system itself, inclusion in microbound diets, as well as in live feeds production units for rotifers, *Artemia*, and copepods. However, in commercial hatchery production environments with poor biosecurity and replication, it has been difficult to determine efficacy of probiotics. This has resulted in the creation of a 'black box' in the commercial sector for such products, with widely varying and inconsistent results. To effectively incorporate probiotics into commercial finfish hatchery production protocols, selection of the appropriate commercially available probiotics for the particular environment and application, proper procedures for incorporation into the hatchery rearing environment and validation of results must be accomplished in replicated and controlled studies. With this baseline information developed, commercial hatcheries could better evaluate and implement the use of probiotics in their production protocols. This would lead to a reduction in hatchery losses, use of chemotherapeutants, and produce higher-health animals, directly improving overall finfish hatchery performance/sustainability.

Objectives

The goal of this project is to increase productivity and economic viability in finfish hatcheries through the application of probiotics during larval stages. Investigations into the viability of commercially available probiotics must be conducted against known bacterial pathogens, applied via appropriate delivery method in to the larviculture protocols, with resulting juveniles then challenged with known pathogens. These investigations must be combined with economic analyses to determine impacts on production efficiencies, costs, and determination of economic viability. The following approaches must include, but are not limited to the following:

- 1) Conduct *in-vitro* trials to determine which commercially available probiotics are effective at inhibiting clinical isolates of bacteria that are pathogenic to fish.
- 2) Conduct *in-vivo* trials by applying viable probiotics, screened from Objective #1, into larviculture applications via appropriate delivery methods. Delivery methods can include dosing the water directly and/or in the larval feed. At a minimum, determine the impacts of probiotics on production variables such as survival, growth, density, and morphology.
- 3) Conduct additional *in-vivo* trials, disease challenge assay using fish from Objective 2, to determine if disease resistance will be increased in fish that have been exposed to probiotics versus those who have not. In addition to survival, other molecular or histological tools should be considered.
- 4) Economic analysis to determine whether application of tested probiotics are economically practical.

Experimental Approach

Preference will be given to the proposal that partners research and extension specialists with strong industrial collaborators. Initially selected probiotics should be tested for efficacy against specific known pathogenic bacteria. Once validated for efficacy, these probiotics should be tested with appropriate replication against controls. Once juveniles have been produced with and without probiotics, they should be challenged with known pathogens to test for immunocompetence effects. All hatchery larval trials will be conducted with commercially viable food fish or ornamental species. Proposals must address all four objectives. To meet the criterion for a regional project, the proposal must include collaboration from scientists in two or more states or territories in the Southern Region (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, U.S. Virgin Islands, and Virginia).

How to Respond

Pre-proposals must address all objectives. Preference will be given to pre-proposals that show a high degree of collaboration and coordination among participants. To meet the criterion for a regional project, the pre-proposal must include collaboration from scientists in two or more states or territories in the Southern Region (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, U.S. Virgin Islands, and Virginia).

The pre-proposal must include a one-page vita for each participant and a proposed budget for each participating institution or organization. Pre-proposals, vitae, and budgets that are not in the proper format will not be considered. (See "Format for Pre-Proposals" file attached or contact Kristen Walters with the SRAC office at 662-686-3269.)

Send an electronic copy of the pre-proposal in Word format to Jimmy Avery, SRAC Director as an email attachment (jimmy.avery@msstate.edu) by **October 31, 2017**. Proposals received after that date will not be considered.