
HSWRI Aquaculture Program Research Report

*** February & March 2007 ***



Shaking Things Up

Stress tests are a useful tool for evaluating larval and juvenile quality in the culture setting – either under routine culture conditions or to test for treatment effects during experiments. We have used salinity stress tests to evaluate the hardiness of marine finfish larvae because it is the most commonly used test for fish and crustaceans. In order to compliment and validate the salinity stress test results, we are now working to develop a physical stress test using a standard laboratory wrist-type shaker (Figure 1). This device can be set to agitate the contents of beakers or test tubes for pre-set periods of time from 1 to 10 minutes. It can also be manually adjusted to agitate at different levels by increasing the angle of rotation or “wrist action”. We believe that this test will allow us to simulate, in a reproducible manner, physical stresses caused by handling, shipping, and water and air circulation in egg and larval rearing systems. In the hatchery physical stressors can be minimized but not avoided completely, so the results will have immediate application for optimizing rearing procedures for different species and life stages.



Figure 1. Laboratory wrist-type shaker used to test egg and larval quality relative to physical stress.

Our preliminary experiments with white seabass eggs suggest that this test can be used to discern differences in egg quality among batches of eggs. Subsequent trials will seek to test the relative hardiness of eggs from different species, as well as developmental stages within species.

Just A Sample, Please

Spawning among white seabass, and California halibut, yellowtail and sheephead usually occurs after-hours and therefore goes unobserved by our research staff. Furthermore, eggs collected in the morning are typically in advanced stages of development that are well beyond



Figure 2. Research biologist Jeff Smiley programs the AES.

the stages when cleavage symmetry can be effectively used as an indicator of egg quality. In an effort to more precisely determine when fish spawn during the night and to simultaneously arrest cell development at set intervals, we are developing protocols that utilize an automatic water sampler used commonly in the wastewater industry (Figure 2). The “Automatic Egg Sampler” or AES is set to draw a seawater sample directly out of the egg traps every 30 minutes over a 12 hour sampling period. Each sample is discharged into a separate 1 L bottle containing enough formalin to yield a 3% final solution when the seawater is added. If eggs are present in the sample, they are “fixed” immediately.

Are You My Mother?

In order to improve our understanding of courtship and spawning behavior in marine fish, we are testing an external tagging method adapted from the agriculture industry that will allow us to identify individual fish among large spawning groups of fish. The “ear tags”, which are typically attached to the ears of small livestock, are instead being attached to the operculum of our brood fish (Figure 3). In a pilot test, two types of tags were applied to several seabass using purpose-built attachment applicators. Attaching the tag involves gently guiding the two tag halves over the posterior edge of the opercle using an applicator. The male half of the tag is inserted under the operculum and the applicator is then used to pierce the male end through the opercle bone. The male barb locks into the female half of the tag on the exterior side of the operculum. Both tag types come in different colors with large alpha-numeric characters that are clearly visible when the fish are swimming.



Figure 3. Female white seabass with a yellow opercle tag (top). Tags and applicators for two tag types (bottom)

The California Aquaculture Association Seats New President

At its quarterly board of directors meeting in February, the California Aquaculture Association (CAA) seated Mark Drawbridge as its new president. Drawbridge replaces Dennis Faria, who stepped down after several years as president (Figure 4). Drawbridge has been an active board member for several years during which time he served as chairman of the Research Committee.

The CAA is largely a producer-based trade association dedicated to supporting and advancing California’s existing \$100 million industry. Drawbridge says he’s honored to take the position and represent such a diverse and hard-working industry. “These are

exciting times – especially in the marine sector with the recent passage of SB201 at a state level and the launching of the National Offshore Aquaculture Act of 2007 at a federal level”. In 2007, CAA has already been very active in assisting the California Department of Fish and Game to replace the state’s aquaculture coordinator, Bob Hulbrock, who recently retired. In addition, CAA is providing valuable input into the programmatic environmental impact report (PEIR) for marine aquaculture, which is being finalized in accordance with SB201.



Figure 4. Mark Drawbridge presents an award of appreciation to former president Dennis Faria for his long-standing commitment to the CAA.

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The Aquaculture Research Program has been active for more than 20 years at HSWRI. The primary objective of this Program is to evaluate the feasibility of culturing marine organisms to replenish ocean resources through stocking, and to supply consumers with a direct source of high quality seafood through traditional aquatic farming. Please direct any questions to Mark Drawbridge at mdrawbridge@hswri.org.

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