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FINE SOLIDS IN SEAWATER HATCHERY

QUESTION:

From: C. Greg Lutz [GLutz@agcenter.lsu.edu](mailto:GLutz@agcenter.lsu.edu)

To: [aqua-l@killick.mi.mun.ca](mailto:aqua-l@killick.mi.mun.ca)

Sent: 22 June 2006

Looking for tips on removing very fine suspended solids from water for a marine hatchery. Apart from hard core filtration, does anyone have any experience with using alum or flocculating agents and then cleaning up with buffering, aeration, EDTA?

C. Greg Lutz

Specialist/Professor

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COMMENTS 1:

The use of flocculating agents depends upon the specific solids and their surface charges. You also need a lot of volume (time) to use a flocculation approach. If you are not footprint limited, it may work, but you are adding a lot of variables to your water chemistry. For larval animals, mechanical removal -- including membrane filtration systems -- may be safer and introduce fewer unknown variables.

Dallas E. Weaver, Ph.D.

Scientific Hatcheries

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COMMENTS 2:

In my experience alum and floc agents won't work very well in seawater. EDTA is a non started because all it will do is chelate Ca and Mg from the seawater...and in high enough quantities will start to compromise fish. What about foam fractionation? Probably the best approach.

Mark Powell

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COMMENTS 3:

I agree with Mark and the challenges in using flocculating agents in a marine hatchery. We use two treatment options in our hatcheries at Harbor Branch (1) ozone and foam fractionation or (2) ozone and 1 to 5 micron bag filters. The differences reflect cost, how much water we are trying to conserve, pump head pressure available, and maintenance/management requirements

Ken Riley [KRiley@HBOI.edu](mailto:KRiley@HBOI.edu)

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COMMENTS 4:

A PROPERLY designed protein skimmer in seawater will to absolute wonders for you! And if you're brave enough to meter in a fraction of O3 under ORP control, you will sparkle.

Michael H. Schwarz, Ph.D.

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FRESH WATER PRAWN POST LARVAE

QUESTION:

From: Jim Chew [aeresources@yahoo.com](mailto:aeresources@yahoo.com)

To: [shrimp@yahoo.com](mailto:shrimp@yahoo.com)

Sent: 18 June 2006

Does anyone have experience in producing fresh water prawn post larvae? I am having problems getting through post larvae stage. The juveniles all look good but can't seem to change into PL. I am using Artemia and egg custard as supplemental feed. Plus water salinity is 12 ppt.

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COMMENTS 1:

Try frozen adult Artemia available in bulk quantities from tropical fish industry. Use in the latter stages before PL. The egg custard is a good energy and source, but doesn't have all the necessary fatty acids and may be causing some water quality problems.

Durwood M. Dugger

Pres. BCI, Inc.

[duggerdm@bellsouth.net](mailto:duggerdm@bellsouth.net)

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COMMENTS 2:

I don't think I can get frozen adult Artemia here in Penang, Malaysia. How about hatching Artemia for 48 hours to get larger size? Then again, I read that larger sized sized Artemia have reduced nutritional value.

Also, I add shrimp/fish meat, cod liver oil, and vitamins for my egg custard feed. Do you think this is ok? The egg custard feed does cause water quality problems and I am thinking of exchanging the water every day. Main worry is that if I do this, it might shock the larvae. I do understand that I have to prepare water of same composition for water exchange. Really unsure on what to do. Any ideas?

Jim Chew [aeresources@yahoo.com](mailto:aeresources@yahoo.com)

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#### COMMENTS 3:

Frozen Artemia can be obtained from Iran. They are also large size. If interested, I will give you contacts.

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#### PUBLICATIONS BY EUROPEAN AQUACULTURE SOCIETY

Larvi 2005 comprises the Mini-papers of the poster contributions (experience papers) and the abstracts of the oral (review) papers, presented at the 4th Symposium on Fish & Shellfish Larviculture (Ghent University, Belgium, September, 2005).

Albeit compiled in the frame of this international symposium, the publication (on CD rom only) can be used as a basis for the state of the art of fish and shellfish larviculture. A content table with handy direct links to the respective articles as well as a search tool (to quickly search in titles as well as in the text) turn this CD into an even more interesting document for interested ones in the field.

AQUA 2006 abstracts has been produced at the occasion of the latest joint meeting in Europe of the World Aquaculture Society (WAS) and the European Aquaculture Society, which took place in Florence, Italy, last May, under the theme "Linking tradition & Technology - Highest quality for the Consumer". These abstracts are available on CD-rom only. The cd comprises in addition to the more than 1050 abstracts also the full programme (including session themes and titles of presentations) and list of exhibitors.

Until July 18, 2006 or depletion of stock there is a special offer (reduction of 70%) on the publications that were issued at the occasion of the previous joint EAS - WAS meeting in Europe held under the theme " Responsible aquaculture in the New Millennium" which was held in 2000. The publications still hold valuable information and are at a most interesting price (including surface postage) as you will note from attached order form.

For more details on all the publications distributed by EAS and for ordering we refer you to the EAS web site at [http://www.easonline.org/publications/en/special\\_publications.asp](http://www.easonline.org/publications/en/special_publications.asp)

(information provided by Hilde Joncheere; [h.joncheere@aquaculture.cc](mailto:h.joncheere@aquaculture.cc))

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EVALUATION OF A SODIUM HYDROXYMETHANESULFONATE PRODUCT FOR REDUCING TOTAL AMMONIA NITROGEN IN A SMALL-SCALE ROTIFER BATCH CULTURE SYSTEM

Marty Riche, Timothy J. Pfeiffer, Javier Garcia-2006  
North American Journal of Aquaculture 68: 199–205

Abstract.:

The total ammonia nitrogen (TAN) produced as metabolic waste in rotifer batch culture systems can reach toxic concentrations as un-ionized ammonia (UIA). Sodium hydroxymethanesulfonate has been used to neutralize TAN in hauling and shipping containers for fish, crustaceans, and mollusks. The objective of this study was to determine the efficacy of a sodium hydroxymethanesulfonate product to neutralize ammonia in a rotifer batch culture system. Rotifers *Brachionus rotundiformis* were stocked at an initial concentration of 80 individuals/mL and were batch-cultured without water exchange for 7 d. We evaluated response variables that included TAN concentration, rotifer production, egg count, and egg : female ratio. Mean maximum TAN was 3.3 mg/L (0.08 mg UIA per liter of water) and 9.5 mg/L (0.84 mg/L UIA) for treated and control groups, respectively. Significant differences were detected in TAN, rotifer density, egg count, and egg : female ratio beginning on day 3 ( $P < 0.05$ ). Beginning on day 2, mean rotifer density declined exponentially in the control group ( $y = 293.4 \cdot e^{-0.249x}$ ;  $R^2 = 0.98$ ) but remained constant in the treated group. Correlation coefficients indicated that TAN explained 72% of the population decrease. We conclude that the use of a sodium hydroxymethanesulfonate product as an ammonia neutralizer is effective in decreasing TAN and UIA in a small-scale rotifer batch culture system.

(U.S. Department of Agriculture, Agricultural Research Service, 5600 U.S. Highway 1 North, Fort Pierce, Florida 34946, USA)

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EVALUATION OF SIX FEEDING REGIMENS FOR SURVIVAL AND GROWTH OF SHORTNOSE STURGEON FRY

Kent M. Ware, James P. Henne, Brian H. Hickson, Kevin Charlesworth-2006  
North American Journal of Aquaculture 68: 211–216

Abstract: The shortnose sturgeon *Acipenser brevirostrum* is a federally listed endangered fish species cultured for recovery efforts. Since high mortality and labor costs are associated with first-feeding sturgeon culture, particularly during the period of dietary conversion from live to formulated feed, we investigated the effects of six feeding regimens on the survival and growth of cultured shortnose sturgeon fry. During the 30-d trial, five replicate groups (100 fish/replicate) of first-feeding shortnose sturgeon were fed according to six regimens: (1) live feed (live nauplii of brine shrimp *Artemia* spp.); (2) formulated (commercially formulated salmonid starter diet); (3) alternate (alternate feedings of the live and formulated feed); (4) transition (slow transition from the live to the formulated feed); (5) automatic (cofeeding the live and formulated feeds with the use of an automatic feeder); and (6) starvation (no feeding). Significantly greater survival rates were observed in the transition (97.4%), automatic (96.0%), alternate (93.8%), and live feed regimens (92.6%) than in the formulated (71.8%) and starvation regimens (31.6%). Length and weight of fish in the alternate (52.4 mm and 0.62 g), automatic (52.3 mm and 0.63 g), transition (46.9 mm and 0.48 g), and live feed regimens (46.4 mm and 0.43 g) were significantly greater than the length and weight of fish in the formulated (31.4 mm and 0.18 g) and starvation regimens (20.6 mm and 0.04 g). Fish weights in the alternate and automatic regimens were significantly greater than those in the live feed regimen. Based on the results of this study, we recommend the automatic regimen for first-feeding shortnose sturgeon culture. This feeding regimen produced heavier fish than the live feed regimen, appeared to reduce labor costs compared with the other feeding regimens, and alleviated possible complications associated with diet conversion.

(U.S. Fish and Wildlife Service, Bears Bluff National Fish Hatchery, Post Office Box 69, Wadmalaw Island, South Carolina, 29487, USA)

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A SIMPLE AND ECONOMICAL METHOD FOR MAINTAINING PRECISE, PROGRAMMABLE THERMAL REGIMES IN RECIRCULATING AQUATIC MESOCOSMS

Jacob F. Schaefer-2006

North American Journal of Aquaculture 68: 240–244

Abstract: A programmable and networkable temperature control system was developed for recirculating aquatic mesocosms. The system allows for dynamic diel thermal regimes that are not possible with commercially available temperature controllers. In operation over 2 years from 2004 to 2006, the system has arrays of tanks that were maintained with stable, variable (constant diel cycle) and stochastic (random diel cycle) thermal regimes. As designed, the system's central computer logs the data and changes set points at regular intervals. Because the dual-stage temperature controllers can be operated over a network, the system is easily expanded to accommodate multiple setups. The controllers can also be operated over a wireless network if necessary. In cases in which greater heating and cooling rates are needed, more powerful equipment can be substituted with minimal change to the controller setup.

(Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, Mississippi 39406, USA)

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APPLICATION OF METHODS FOR THE DETOXIFICATION AND NEUTRALIZATION OF FORMALIN IN FISH HATCHERY EFFLUENTS

J. M. Gearheart, A. L. Masters, and J. Bebak-Williams-2006

North American Journal of Aquaculture 68: 256–263

Abstract: Sodium sulfite, Neutralex, hydrogen peroxide, and hydrogen peroxide with a ferric iron catalyst were studied for potential application in reducing formalin in effluents from aquaculture facilities. The neutralization capacity of each method was examined at formalin concentrations that are typically found in effluents from fish hatcheries that utilize formalin to control ectoparasite infestations on fish. The toxicities of the products were also evaluated. A 75% reduction in formalin concentration was observed within the first 10 min after the addition of sodium sulfite at a 3:1 (sodium sulfite:formalin) mass treatment ratio. The addition of Neutralex to test solutions at a 6:1 (Neutralex:formalin) mass treatment ratio reduced the formalin concentration by approximately 90% of initial values within 10 min and completely eliminated formalin within 20 min. Degradation of formalin was not successful under the test conditions using hydrogen peroxide alone or in combination with a ferric iron catalyst. Both of the sodium sulfite–formalin and Neutralex–formalin reaction products were more toxic to *Ceriodaphnia dubia* test animals than formalin alone. Although regulatory limits for formalin discharge from aquaculture facilities could most likely be achieved with sodium sulfite or Neutralex, the direct discharge of their neutralizer–formalin reaction products would probably be harmful to some aquatic species.

(The Conservation Fund Freshwater Institute, 1098 Turner Road, Shepherdstown, West Virginia 25443, USA)

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REDUCED FORMALIN AND HYDROGEN PEROXIDE TREATMENTS DURING WALLEYE EGG INCUBATION

Craig A. Soupir, Michael E. Barnes

North American Journal of Aquaculture 68: 276–280

Abstract:

Formalin use was evaluated as part of an investigational new animal drug study to determine its effectiveness in controlling fungus (water molds: Saprolegniaceae) on incubating eggs of the walleye *Sander vitreus*. Hydrogen peroxide was also evaluated as an egg treatment alternative to formalin. In total, three antifungal chemical treatment regimes (15 min daily) were evaluated during this study. Eggs were treated with 200 mg of hydrogen peroxide/L of water, 834 mg formalin/L, and the industry standard of 1,667 mg formalin/L. Untreated control eggs were severely infested with fungus and experienced survival to hatch that was significantly lower than that of the chemically treated eggs.

Formalin and hydrogen peroxide treatments both controlled fungus and produced similar egg survival to initial hatch. However, walleye egg survival was significantly greater in jars treated with 1,667 mg formalin/L than in any other treatment. This study provided important new data on the use of chemical treatment concentrations lower than the standard of 1,667 mg formalin/L or 500 mg hydrogen peroxide/L to control fungus on incubating walleye eggs.

(South Dakota Department of Game, Fish, and Parks, Region IV District Office, 603 East 8th Avenue, Webster, South Dakota 57274, USA)

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#### USE OF LUTEINIZING HORMONE RELEASING HORMONE ANALOG AND HUMAN CHORIONIC GONADOTROPIN TO SPAWN EARLY-EGG-STAGE STRIPED BASS

David M. Yeager-2006

North American Journal of Aquaculture 68: 287–290

Abstract:

Female striped bass *Morone saxatilis* with eggs in early stages of development were successfully spawned after being given a priming injection of luteinizing hormone releasing hormone analog followed by a resolving injection of human chorionic gonadotropin (HCG). Over 2 years, 18 of 19 injected fish spawned, producing over 3.5 million viable fry. Egg fertilization rates for all fish that spawned averaged 41%. This procedure, which differs from the traditional spawning method of HCG injection, can increase production by increasing the duration of the production season. In addition, broodfish that once would have been released at capture because they contained early egg developmental stages can now be spawned and used in production.

(Florida Fish and Wildlife Conservation Commission, Blackwater Fisheries Research and Development Center, 8384 Fish Hatchery Road, Holt, Florida 32564, USA)

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#### EFFECTS OF DIETARY LIPID AND FATTY ACIDS ON WHITE BASS REPRODUCTIVE PERFORMANCE, EGG HATCHABILITY, AND OVERALL QUALITY OF PROGENY

Ryan L. Lane, Christopher C. Kohler-2006

North American Journal of Aquaculture 68: 141–150

Abstract:

We evaluated the dietary effects of graded levels of highly unsaturated fatty acids (HUFAs) fed to broodstock female white bass *Morone chrysops* on reproductive performance, egg hatchability, and larval survival of sunshine bass (female white bass × male striped bass *M. saxatilis*) through the endogenous feeding stage. Dietary treatments consisted of four isocaloric, isonitrogenous diets formulated to contain 45% crude protein and 15% lipid with graded levels of menhaden oil (0, 25, 75, and 100%) or corn oil as the dietary lipid variable. Significant differences existed among the dietary groups in egg fatty acids, which reflected levels in the maternal diet, especially for the neutral lipid component. Similar trends were also found in fatty acids of the polar lipid component and conservation of HUFAs; significantly higher quantities of linoleic acid (18:2[n-6]) were associated with increasing dietary inclusion of corn oil. Eggs with higher hatchability were associated with higher levels of n-3 HUFAs, including eicosapentaenoic acid (20:5[n-3]), docosapentaenoic acid (22:5[n-3]), and docosahexaenoic acid (22:6[n-3]). Our results suggest that white bass broodstock females possess low and moderate regulatory control of fatty acid deposition to the egg within the neutral and polar components, respectively. These results indicate that little to no elongation or desaturation of dietary fatty acids occurs during egg development. Accordingly, the inclusion of elevated levels of dietary HUFAs for white bass broodstock appears to be warranted.

(Fisheries and Illinois Aquaculture Center and Department of Zoology, Southern Illinois University, Carbondale, Illinois 62901-6511, USA)

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#### HYDROGEOCHEMISTRY OF SEASONAL VARIATION OF URMIA SALT LAKE, IRAN

Samad S. Alipour-2006

Saline Systems 2: 9

Abstract:

Urmia Lake has been designated as an international park by the United Nations. The lake occupies a 5700 km<sup>2</sup> depression in northwestern Iran. Thirteen permanent rivers flow into the lake. Water level in the lake has been decreased 3.5 m in the last decade due to a shortage of precipitation and progressively dry climate. Geologically the lake basin is considered to be a graben of tectonic origin. Na, K, Ca, Li and Mg are the main cations with Cl, SO<sub>4</sub>, and HCO<sub>3</sub> as the main anions. F & Br are the other main elements in the lake. A causeway crossing the lake is under construction, which may affect the lakes annual geochemistry. The main object of this project is mainly to consider the potential of K-mineral production along with ongoing salt production. Seven hundred and four samples were taken and partially analyzed for the main cations and anions. Surface water (0.5 m. depth) was analyzed for Na, K, Mg, Ca, Br and Li, and averaged 87.118 g/lit, 1.48 g/lit, 4.82 g/lit, 4.54 g/lit, 1.19 ppm and 12.7 ppm respectively for the western half of the lake. Sodium ranged between 84 to 91.2 g/lit, and showed higher concentrations in the south than in the north. This unexpected result may be caused by shallower depth in the south and a higher net evaporation effect. Calcium ranged between 4.2 to 5 g/lit, apparently slightly higher in the north. K is higher in the south, possibly due to rivers entering from south that may carry slightly higher K in solution. In the middle-range samples (0.5- 5m.), K averaged 1.43 g/lit and ranged from 1.40 to 1.46 g/lit. At this intermediate depth the distribution of K is clearly higher to the south of the causeway that is currently under construction. It is not clear whether this increase is the effect of the causeway or the effect of the salty Aji-Chay River to the east, and the Khoy salt domes to the north of the lake. At depth (5m.- 10m), K averaged 1.48 g/lit and ranged from 1.4 to 1.49 g/lit, differing only in the second decimal from the average of the middle and surface samples. Ignoring the small difference between the averages of the three sample depths, the distribution of K is highly homogeneous in the lake water due to the mixing process. Therefore causeway construction has not yet strongly affected K distribution, or it may be at the starting point. Magnesium concentration ranged from 4.6 to 5-g/lit, and was elevated in the south. This differs somewhat compared to calcium. Lithium, with an average of 12-13 ppm, is slightly higher in the south, and has not shown any significant variation in all three seasons. Iodine was below the detection limit in the lake. Urmia Lake, geochemically, is highly uniform both to the south and north of the causeway, in both the surface and deep brines. K and Mg, which average 1.48 and 6.6 g/lit in order, could be elements worth production in addition to the NaCl currently being produced from the lake. Br, F, Li and B in the limit of <50 ppm dont look to be in the economical range.

(University of Urmia, PO Box 165, Urmia, Iran; [Alipour\\_Samad@yahoo.com](mailto:Alipour_Samad@yahoo.com))

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SOMITE FORMATION AND EXPRESSION OF MYOD, MYOGENIN AND MYOSIN IN ATLANTIC HALIBUT (*HIPPOGLOSSUS HIPPOGLOSSUS* L.) EMBRYOS INCUBATED AT DIFFERENT TEMPERATURES: TRANSIENT ASYMMETRIC EXPRESSION OF MYOD

Trina F. Galloway, Tora Bardal, Sylvia N. Kvam, Stine W. Dahle, Gaute Nesse, Markus Randøl, Elin Kjørsvik, Øivind Andersen-2006

Journal of Experimental Biology 209: 2432-2441

Abstract:

Genes encoding the myogenic regulating factors MyoD and myogenin and the structural muscle proteins myosin light chain 2 (MyLC2) and myosin heavy chain (MyHC) were isolated from juvenile Atlantic halibut (*Hippoglossus hippoglossus* L.). The impact of temperature on their temporal and spatial expression during somitogenesis were examined by incubating halibut embryos at 4, 6 and 8°C, and regularly sampling for whole-mount in situ hybridisation and reverse transcription (RT)-PCR.

There were no significant effects of temperature on the onset of somitogenesis or number of somites at hatching. The rate of somite formation increased with increasing temperature, and the expression of MyoD, myogenin and MyHC followed the cranial-to-caudal somite formation. Hence, no significant effect of temperature on the spatial and temporal expression of the genes studied was found in relation

to somite stage. MyoD, which has subsequently been shown to encode the MyoD2 isoform, displayed a novel bilaterally asymmetric expression pattern only in white muscle precursor cells during early halibut somitogenesis. The expression of myogenin resembled that previously described for other fish species, and preceded the MyHC expression by approximately five somites. Two MyLC2 cDNA sequences were for the first time described for a flatfish, probably representing embryonic (MyLC2a) and larval/juvenile (MyLC2b) isoforms.

Factors regulating muscle determination, differentiation and development have so far mostly been studied in vertebrates with external bilateral symmetry. The findings of the present study suggest that more such investigations of flatfish species could provide valuable information on how muscle-regulating mechanisms work in species with different anatomical, physiological and ecological traits. (Department of Biology, Brattøra Research Centre, Norwegian University of Science and Technology (NTNU), N-7491 Trondheim, Norway; email of Trine Galloway: [trine.galloway@biomar.no](mailto:trine.galloway@biomar.no))

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