INFORMATION OF INTEREST

- **Allfish** is a public-private partnership created by the seafood industry, working in partnership with the World Bank, FAO and the Global Environment Facility to establish more economically and environmentally sustainable fisheries and successful aquaculture operations, particularly in developing countries: see website
- The Israeli Journal of Aquaculture: For your information, the titles and abstracts of articles in IJA Vol. 61(4) are now online. To see the titles and abstracts of Vol. 61(3) with the proceedings of the SEAFDEC International Workshop on Emerging Diseases in Asia, click here
- International Conference Aral '09 (two centuries of the Aral Sea investigations), October 12-15, 2009, Saint Petersburg, Russia: conference materials
- Brine shrimpers on the Great Salt Lake, Utah-USA: story about Artemia cyst harvesting anno 2009 (Tooele Transcript Bulletin Online, December 24;, 2009)
- Nutritional composition of aquatic products: analytical data for 47 aquatic products whose levels in 20 nutrients (vitamins, minerals, macronutrients) as well as fatty acids have been established see website of NUTRAQUA project
- Environmental impact assessment and monitoring in aquaculture: requirements, practices, effectiveness and improvements.FAO Fisheries and Aquaculture Technical Paper 527, Rome 2009
- Proceedings of the 2nd Global COE Program Symposium of Kinki University, South Australian Research and Development Institute, Henley Beach, Adelaide, Australia, Dec 1-2, 2009 "Sustainable aquaculture of the bluefin and yellowfin tuna – closing the life cycle for commercial production"
- Fish Health Section of the Asian Fisheries Society: e-Newsletter No. 5 (2009)
- Promicrobe - Microbes as positive actors for more sustainable aquaculture flyer - website
- Clever whales: see article "Eco-physiological repercussions of dietary arachidonic acid in cell membranes of active tissues of the Gray whale"
- The WorldFish Center Publications Alert Vol. 2 2009
- FAO Aquaculture e-Bulletin: link for issue December 2009; link for subscription

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REPRODUCTION, EARLY DEVELOPMENT AND LARVICULTURE OF THE BARBER GOBY, ELACATINUS FIGARO (SAZIMA, MOURA & ROSA 1997)

Maria Eugenia Meirelles, Mônica Yumi Tsuzuki, Flávio Furtado Ribeiro, Rodrigo Cassula Medeiros, Israel Diniz Silva-2010

Aquaculture Research 41(1): 11-18

ABSTRACT:

The barber goby, Elacatinus figaro, is a cleaner species of ecological importance and of keen interest to the aquarium trade. Endemic to Brazil, it is a threatened species and so aquaculture is a potential solution for reducing pressure on the natural stocks. This study describes the reproductive behaviour, the embryonic and larval development and the general breeding and rearing conditions. Ten wild fish initiated the formation of breeding pairs 20 days after acclimation to captivity. Spawning started 12 days after the first pair was formed, with one female from each pair spawning from 140 to 700 eggs

(n=15 spawnings). The average period of incubation of the eggs was 6.8 days at 25 °C. The best hatching rate was 99.5% (n=10 spawnings). Larval rearing used Nannochloropsis oculata with rotifers (Brachionus rotundiformis) as the first food (day 0–25); nauplii and meta-nauplii of Artemia were fed from day 18 until larval metamorphosis with subsequent weaning using commercial marine fish diets. The transformation to juveniles started at around the 30th day post hatch. The best larval survival rate until complete metamorphosis was 30.6% (n=4 larvicultures). After this period, the mortality was insignificant. This study demonstrated that the cultivation of barber goby is feasible.
(Laboratório de Piscicultura Marinha, Departamento de Aqüicultura, Centro de Ciências Agrárias, Universidade Federal de Santa Catarina, C.P. 476, Florianópolis, SC, Brazil ; email of M. Y. Tsuzuki: mtsuzuki@cca.ufsc.br)

MORPHOLOGICAL DEVELOPMENT AND GROWTH PATTERNS OF THE LEOPARD GROUPER MYCTEROPERCA ROSACEA DURING LARVAL DEVELOPMENT
Roberto Martínez-Lagos, Vicente Gracia-López-2010
Aquaculture Research 41(1): 120-128
ABSTRACT:
At 25 °C, metamorphosis in leopard grouper Mycteroperca rosacea larvae took 60 days after hatching. The total length at day 1 was 1.95±0.22 mm and juveniles reached a length of 30.64±0.23 mm at day 60; the increase was approximately linear. We describe eight stages of development during this period. Larvae with the yolk sac attached occur from days 1 to 4 (Stages 1 and 2). The preflexion occurs on days 5–20 (Stages 3 and 4). Bending notochord occurred at day 25 (Stage 5). The other morphological changes that precede the juvenile phase occurred progressively until day 60 (Stages 6–8). Allometric growth in the height and length of the head, trunk length, height and length of the tail and the diameter of the eye compared with the total length showed two distinct stages of growth. Inflexion point, where growth is positive, occurred when larvae reached between 18.75 and 21.59 mm, which corresponds to larvae at days 35–40.
(Centro de Investigaciones Biológicas del Noroeste (CIBNOR), Mar Bermejo 195, Col. Playa Palo Santa Rita, La Paz BCS 23090, México; email of V. Gracia-López: vinny@cibnor.mx)

SPAWNING INDUCTION OF PEJERREY ODONTESTHES BONARIENSIS IN CAPTIVITY USING SUSTAINED-RELEASE GONADOTROPIN RELEASING HORMONE AGONIST IMPLANTS
Leandro A. Miranda, Gustavo M. Somoza-2010
Aquaculture Research 41(1): 129-134
ABSTRACT:
The aim of this study was to induce and synchronize spawning of pejerrey Odontesthes bonariensis (Valenciennes, 1835), using gonadotropin releasing hormone agonist (GnRHa) implants. In the first experiment, the ovarian condition was assessed by ovarian biopsies and the measurement of the genital pore width (GPW). Females having the leading clutch of oocytes with a diameter of around 800–900 μm and a GPW between 4.5 and 5.5 mm were treated with GnRHa implants. Eighty per cent of females spawned between 2 and 9 days after treatment, 12 days earlier than 20% of the fish in the control group that presented signs of spawning activity. In order to avoid any possible ovarian injury and/or stress by the catheterization procedure, in a second experiment, females were selected only by visual inspection of the abdomen and GPW measurement. As in experiment 1, 80% of females spawned between 2 and 8 days after treatment, 8 days earlier than 30% of the fish that spawned in the control group. In both experiments, fertilization and hatching success were similar between control and GnRHa-treated groups. These results clearly demonstrated that GnRHa implantation can advance and synchronize ovulation and spawning in pejerrey without affecting egg quality.
(Laboratorio de Ictiofisiología y Acuicultura, Instituto de Investigaciones Biotecnológicas-Instituto Tecnológico de Chascomús (IIB-INTECH) (CONICET-UNSAM), Camino de Circunvalación Laguna Km, 6 (B7130IWA) Chascomús, Buenos Aires, Argentina; email of L.A. Miranda: lmiranda@intech.gov.ar)

LINKING EGG THIAMINE AND FATTY ACID CONCENTRATIONS OF LAKE MICHIGAN LAKE TROUT WITH EARLY LIFE STAGE MORTALITY

Sergiusz Czesny, John M. Dettmers, Jacques Rinchard, Konrad Dabrowski -2009

Journal of Aquatic Animal Health 21: 262-271

ABSTRACT:

The natural reproduction of lake trout Salvelinus namaycush in Lake Michigan is thought to be compromised by nutritional deficiency associated with inadequate levels of thiamine (vitamin B1) in their eggs. However, mortality driven by thiamine deficiency (commonly referred to as early mortality syndrome [EMS]) is not the only significant cause of low lake trout survival at early life stages. In this study, we sought to better understand the combined effects of variable levels of thiamine and fatty acids in lake trout eggs on prehatch, posthatch, and swim-up-stage mortality. We sampled the eggs of 29 lake trout females from southwestern Lake Michigan. The concentrations of free thiamine and its vitamers (e.g., thiamine monophosphate [TMP] and thiamine pyrophosphate [TPP]) as well as fatty acid profiles were determined in sampled eggs. Fertilized eggs and embryos were monitored through the advanced swim-up stage (1,000 degree-days). Three distinct periods of mortality were identified: prehatch (0–400 degree-days), immediately posthatch (401–600 degree-days), and swim-up (601–1,000 degree-days). Stepwise multiple regression analysis revealed (1) that cis-7-hexadecenoic acid in both neutral lipids (NL) and phospholipids (PL) correlated with prehatch mortality, (2) that docosapentaenoic acid in PL and docosahexaenoic acid in NL correlated with posthatch mortality, and (3) that total lipids, TPP, and palmitoleic acid in NL, linoleic acid, and palmitic acid in PL correlated with the frequency of EMS. These results indicate the complexity of early life stage mortality in lake trout and suggest that inadequate levels of key fatty acids in eggs, along with variable thiamine content, contribute to the low survival of lake trout progeny in Lake Michigan.

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LINKING EGG THIAMINE AND FATTY ACID CONCENTRATIONS OF LAKE MICHIGAN LAKE TROUT WITH EARLY LIFE STAGE MORTALITY

Sergiusz Czesny, John M. Dettmers, Jacques Rinchard, Konrad Dabrowski-2009

ABSTRACT:

The natural reproduction of lake trout Salvelinus namaycush in Lake Michigan is thought to be compromised by nutritional deficiency associated with inadequate levels of thiamine (vitamin B1) in their eggs. However, mortality driven by thiamine deficiency (commonly referred to as early mortality syndrome [EMS]) is not the only significant cause of low lake trout survival at early life stages. In this study, we sought to better understand the combined effects of variable levels of thiamine and fatty acids in lake trout eggs on prehatch, posthatch, and swim-up-stage mortality. We sampled the eggs of 29 lake trout females from southwestern Lake Michigan. The concentrations of free thiamine and its vitamers (e.g., thiamine monophosphate [TMP] and thiamine pyrophosphate [TPP]) as well as fatty acid profiles were determined in sampled eggs. Fertilized eggs and embryos were monitored through the advanced swim-up stage (1,000 degree-days). Three distinct periods of mortality were identified: prehatch (0–400 degree-days), immediately posthatch (401–600 degree-days), and swim-up (601–1,000 degree-days). Stepwise multiple regression analysis revealed (1) that cis-7-hexadecenoic acid in both neutral lipids (NL) and phospholipids (PL) correlated with prehatch mortality, (2) that docosapentaenoic acid in PL and docosahexaenoic acid in NL correlated with posthatch mortality, and (3) that total lipids, TPP, and palmitoleic acid in NL, linoleic acid, and palmitic acid in PL correlated with the frequency of EMS. These results indicate the complexity of early life stage mortality in lake trout and suggest that inadequate levels of key fatty acids in eggs, along with variable thiamine content, contribute to the low survival of lake trout progeny in Lake Michigan.

(University of Illinois, Illinois Natural History Survey, Lake Michigan Biological Station, 400 17th Street, Zion, Illinois 60099, USA; email of Sergiusz Czesny: czesny@illinois.edu

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EGG FATTY ACID COMPOSITION FROM LAKE TROUT FED TWO LAKE MICHIGAN PREY FISH SPECIES

Dale C. Honeyfield, John D. Fitzsimons, Donald E. Tillitt, Scott B. Brown-2009
Journal of Aquatic Animal Health 21: 272-278
ABSTRACT:
We previously demonstrated that there were significant differences in the egg thiamine content in lake trout Salvelinus namaycush fed two Lake Michigan prey fish (alewife Alosa pseudoharengus and bloater Coregonus hoyi). Lake trout fed alewives produced eggs low in thiamine, but it was unknown whether the consumption of alewives affected other nutritionally important components. In this study we investigated the fatty acid composition of lake trout eggs when females were fed diets that resulted in different egg thiamine concentrations. For 2 years, adult lake trout were fed diets consisting of four combinations of captured alewives and bloaters (100% alewives; 65% alewives, 35% bloaters; 35% alewives, 65% bloaters; and 100% bloaters). The alewife fatty acid profile had higher concentrations of arachidonic acid and total omega-6 fatty acids than the bloater profile. The concentrations of four fatty acids (cis-13, 16-docosadienoic, eicosapentaenoic, docosapentaenoic, and docosahexaenoic acids) were higher in bloaters than in alewives. Although six fatty acid components were higher in lake trout eggs in 2001 than in 2000 and eight fatty acids were lower, diet had no effect on any fatty acid concentration measured in lake trout eggs in this study. Based on these results, it appears that egg fatty acid concentrations differ between years but that the egg fatty acid profile does not reflect the alewife–bloater mix in the diet of adults. The essential fatty acid content of lake trout eggs from females fed alewives and bloaters appears to be physiologically regulated and adequate to meet the requirements of developing embryos.
(U.S. Geological Survey, Northern Appalachian Research Laboratory, 176 Straight Run Road, Wellsboro, Pennsylvania 16901, USA; email of Dale C. Honeyfield: honeyfie@usgs.gov)

MOLECULAR MARKERS OF YOLK SAC FRY DEVELOPMENT IN NINE FAMILIES OF LAKE TROUT
Kristiina A. Vuori, Tiia Paavilainen, Mikko Nikinmaa, Sergiusz Czesny, Jacques Rinchard-2009
Journal of Aquatic Animal Health 21: 279-289
Abstract:
Salmonids in certain areas of North America and northern Europe suffer from reproductive disturbances manifested through the death of yolk sac fry. These disturbances are referred to as early mortality syndrome (EMS) in the Great Lakes region and M74 in the Baltic Sea. Both of these syndromes have been associated with reduced concentrations of thiamine in affected females and their eggs. However, large variations in signs and mortality, both within and between the individual syndromes, have been reported. Yolk sac fry mortality (M74) in Atlantic salmon Salmo salar has been shown to be associated with reduced DNA binding of the hypoxia-inducible transcription factor 1 (HIF-1), reduced production of vascular endothelial growth factor (VEGF) protein, decreased capillary density, and down-regulation of adult-type globin gene transcription (which is responsible for the protein part of adult hemoglobin). One of the main effects of all of these changes is reduced oxygen transport to the tissues of affected fry. In this study, the developmental patterns of HIF-1 DNA binding, VEGF protein expression, and adult-type globin gene transcription were analyzed in nine family groups of Lake Michigan lake trout Salvelinus namaycush. The results indicate that HIF-1 DNA binding and globin gene transcription increase from hatch to the end of yolk sac stage. Interindividual and between-family biological variations were detected, especially in VEGF protein expression and globin gene transcription. Our results demonstrate the possibility of using these molecular markers in investigating the etiology of EMS and making comparisons between the mechanisms of different salmonid yolk sac fry mortalities.
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INFLUENCE OF THIAMINE DEFICIENCY ON LAKE TROUT LARVAL GROWTH, FORAGING, AND PREDATOR AVOIDANCE
John D. Fitzsimons, Scott B. Brown, Bill Williston, Georgina Williston, Lisa R. Brown, Kristin Moore, Dale C. Honeyfield, Donald E. Tillitt-2009

Journal of Aquatic Animal Health 21: 302-314
Abstract:
Diet-related thiamine deficiency increases the acute mortality, known as early mortality syndrome, of salmonines from some of the Great Lakes. The consequences of thiamine deficiency as measured at the egg stage for other important early life stage processes like growth, foraging efficiency, and predator avoidance that may also result in mortality, are unknown. Accordingly, we investigated the impacts of low thiamine on the specific growth rate (SGR) of first-feeding fry, the ability of first-feeding fry to capture Daphnia, fry emergence in the presence of a potential predator (round goby Apollina [formerly Neogobius] melanostomus), and predation by slimy sculpin Cottus cognatus. We used a combination of thiamine-deficient and thiamine-replete wild stocks of lake trout Salvelinus namaycush for this purpose. From these investigations we developed predictive relationships. Specific growth rate was related to egg thiamine concentration. From the exponential relationship, it was predicted that the threshold egg thiamine concentrations associated with 20% and 50% reductions in SGR are 8.1 and 5.1 nmol/g, respectively. The foraging rate on Daphnia was also related to egg thiamine concentration by an exponential relationship. It was predicted that the threshold concentrations associated with 20% and 50% reductions in this rate are 6.9 and 2.9 nmol/g, respectively. The presence of a round goby significantly reduced emergence success, but the level of goby predation was unrelated to egg thiamine concentration. Sculpin predation was related, although weakly, to the initial egg thiamine concentration. This research found that thiamine deficiency affected growth, foraging, and predator avoidance in lake trout fry. Growth effects resulting from thiamine deficiency may represent the most sensitive means of monitoring the impact of the secondary consequences of thiamine deficiency. Mortality associated with the combined effects of reduced growth and foraging has the potential to seriously impair lake trout recruitment.
(Department of Fisheries and Oceans, Bayfield Institute, 867 Lakeshore Road, Burlington, Ontario L7R 4A6, Canada; email of John D. Fitzsimons: john.fitzsimons@dfo-mpo.gc.ca)

THIAMINE DEFICIENCY EFFECTS ON THE VISION AND FORAGING ABILITY OF LAKE TROUT FRY

Paulo S. M. Carvalho, Donald E. Tillitt, James L. Zajicek, Rachel A. Claunch, Dale C. Honeyfield, John D. Fitzsimons, Scott B. Brown-2009
Journal of Aquatic Animal Health 21: 315-325
ABSTRACT:
The exact causes of the historical recruitment failures of Great Lakes lake trout Salvelinus namaycush are unknown. Thiamine deficiency has been associated with neurological abnormalities in lake trout that lead to early mortality syndrome (EMS) in salmonine swim-up fry, and EMS-related mortality at the swim-up stage is a factor that contributes to the reproductive failure of lake trout populations in the Great Lakes. The potential for adverse effects of thiamine deficiency beyond the swim-up stage is unknown. We investigated the effects of low egg thiamine on behavioral functions in young, post-swim-up lake trout fry. The behavioral endpoints included visual acuity and prey capture rates in the same groups of lake trout fry from each family. Low-thiamine eggs were produced by feeding lake trout broodstock diets entailing thiaminase activity. The thiamine content of the spawned eggs ranged from 0.3 to 26.1 nmol/g. Both visual acuity and prey capture rates were affected by the thiamine content of the eggs. The visual acuity of lake trout was severely affected by low egg thiamine, mainly at thiamine concentrations below the threshold of 0.8 nmol/g but also at higher concentrations in field-collected eggs. Feeding was also reduced with low egg thiamine content. The reduction of prey capture rates was dramatic below 0.8 nmol/g and less dramatic, but still significant, in a portion of the families with egg thiamine concentrations of less than 5.0 nmol/g from both laboratory and field samples. Approximately one-third of the latter families had reduced feeding rates. Deficits in visual acuity may be part of the mechanism leading to decreased feeding rates in these fry. The effects of low egg thiamine on both of the behavioral endpoints studied increase the risk of low recruitment rates in Great Lakes lake trout populations.
(Department of Zoology, Universidade Federal de Pernambuco, Avenida Profesor Moraes Rego S/N, Cidade Universitária, Recife, Pernambuco 50670-420, Brazil; email of Paulo S. M. Carvalho: pcarvalho@ufpe.br)

THE COPEPOD CALANUS FINMARCHICUS: A POTENTIAL VECTOR FOR TROPHIC TRANSFER OF THE MARINE ALGAL BIOTOXIN, DOMOIC ACID

Luis F. Leandro, Gregory J. Teegarden, Patricia B. Roth, Zhihong Wang, Gregory J. Doucette-2010

Journal of Experimental Marine Biology and Ecology 382(2): 88-95

ABSTRACT:

The marine algal biotoxin, domoic acid (DA), is produced by certain members of the diatom genus Pseudo-nitzschia. This neurotoxin has been responsible for several mass mortality events involving marine birds and mammals. In all cases, the toxin was transferred from its algal producers through marine food webs by one or more intermediate vectors. The ability of some copepod taxa to serve as vectors for DA has been demonstrated; however, the role played in DA trophic transfer by Calanus finmarchicus, which often dominates N. Atlantic zooplankton assemblages and is a primary dietary component of the highly endangered N. Atlantic right whale (Eubalaena glacialis), has been uncertain. In the present study, we examined the ability of C. finmarchicus to consume DA-producing algae and retain the toxin. Results of grazing and toxin accumulation/depuration experiments showed that C. finmarchicus consumed DA-producing Pseudo-nitzschia multiseries regardless of the presence or absence of morphologically similar, but non-toxic, P. pungens, across initial cell concentrations ranging from 1000–4000 cells mL− 1. Furthermore, C. finmarchicus did not appear to preferentially consume or avoid either Pseudo-nitzschia species tested. After ingestion of P. multiseries, copepods accumulated DA and retained it for up to 48 h post-removal of the toxin source. These findings provide evidence for the potential of C. finmarchicus to facilitate DA trophic transfer in marine food webs where toxic Pseudo-nitzschia is present.

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REARING TRIALS OF HALLA PARTHENOPEIA UNDER LABORATORY CONDITIONS (POLYCHAETA: OENONIDAE)

Inas H. Osman, Howaida R. Gabr, Salah Gh. El-Etreby-2010

Journal of Experimental Marine Biology and Ecology 383(1): 1-7

ABSTRACT:

A small scale attempt to maintain and rear the worm Halla parthenopeia in laboratory conditions was conducted. Five bivalve species (Paphia undulata, Cerastoderma glaucum, Venerupis pullastra, Ruditapes decussata, and Gafrarium pectinatum) were used to investigate preferred food item, feeding rate and growth of the worm. Halla parthenopeia are capable of using different types of clams, although they grew better with Paphia undulata and C. glaucum as food items. The highest average daily predation rates in case of P. undulata as a prey were 1.73, 2.13 and 2.57 individuals per predator per day for small, medium and large groups of H. parthenopeia, respectively. The daily predation rate on C. glaucum was low with an average: 0.50, 0.63 and 0.73 individuals per predator per day for the small, medium and large worm groups, respectively. The daily growth rate of H. parthenopiea increased when it was fed P. undulata (average: 0.083, 0.071 and 0.038 g/day for small, medium and large worm groups respectively), compared to an average of 0.044, 0.034 and 0.020 g/day for small, medium and large worm groups, respectively, when worms were fed with C. glaucum. The biochemical composition of three different sizes of the worm was also determined. Protein was the highest biochemical constituent with an average of 51% of the dry weight, followed by lipids with an average of 25.88% of the dry weight; meanwhile carbohydrate was present at an average of 20.72%. Our findings indicate that growth of H. parthenopeia can be improved when fed with a suitable prey item and suggest that it is feasible to successfully culture this protein-rich worm in captivity.

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EVALUATION OF LARVAL GROWTH AND SURVIVAL IN MEXICAN MOJARRA, CICHLASOMA UROPHTHALMUS, AND BAY SNOOK, PETENIA SPLENDIDA, UNDER DIFFERENT INITIAL STOCKING DENSITIES

Luis Daniel Jiménez-Martínez, Carlos A. Alvarez-GonzÁlez, Wilfrido M. Contreras-Sánchez, Gabriel Márquez-Couturier, Lenin Arias-Rodríguez, José A. Almeida-Madrigal-2009

Journal of the World Aquaculture Society 40(6): 753 – 761

ABSTRACT:

Two experiments were conducted to evaluate the initial stocking density in larvae of Bay snook, Petenia splendida, and Mexican mojarra, Cichlasoma urophthalmus, using a recirculation system. Five initial stocking densities (0.5, 1, 5, 10, and 20 larvae/L) were evaluated by triplicate for 45 d. Weight and total length (TL) were measured every 15 d, and fish production was calculated for each density. The larvae stocked at the lowest densities (0.5 and 1 larvae/L) presented the highest growth for both species: C. urophthalmus (0.78 g and 45-mm TL, and 0.76 g and 45-mm TL, respectively) and P. splendida (0.80 g and 52-mm TL, and 0.79 g and 49-mm TL, respectively). However, lowest fish production was recorded (35 and 69 fish per tank, respectively, for C. urophthalmus and 34 and 70 fish per tank, respectively, for P. splendida) compared with those at densities of 5, 10, and 20 larvae/L (336, 584, and 604 fish per tank, respectively, for C. urophthalmus and 341, 679, and 912 fish per tank, respectively, for P. splendida). The polynomial model for biomass production related to the stocking density shows that the optimum stocking densities for C. urophthalmus and P. splendida are 12 and 14 larvae/L, respectively.

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EFFECT OF DIETARY ASTAXANTHIN ON GROWTH, SURVIVAL, AND STRESS TOLERANCE OF POSTLARVAL SHRIMP, LITOPENAEUS VANNAMEI

Jin Niu, Li-Xia Tian, Yong-Jian Liu, Hui-Jun Yang, Chao-Xia Ye, Wen Gao, Kang-Sen Mai-2010

Journal of the World Aquaculture Society 40(6): 795 – 802

ABSTRACT:

The effect of dietary astaxanthin on growth, survival, and stress tolerance was determined in postlarval Litopenaeus vannamei. An experiment was performed with postlarval shrimp (mean initial wet weight 1.2 mg) fed four isoenergic and isonitrogenous diets containing four supplemented levels of astaxanthin (0, 100, 200, and 400 mg/kg diet, respectively). Shrimp fed diets containing 100, 200, and 400 mg astaxanthin/kg diet for 30 d showed higher weight gain (WG, %) and survival compared to the control (without supplementation of astaxanthin). Specific growth rate (SGR, %/day) and final body wet weight (FBW, mg) showed the same pattern as WG. There were no significant differences in growth performance (FBW, WG, and SGR) among the groups fed the diets with astaxanthin supplementation at the termination of feeding trial. Survival of shrimp in the control and 100 mg/kg diet treatments was significantly lower than that of shrimp in the treatments with 200 and 400 mg/kg diet. After 9 d of a stress tolerance test, survival of shrimp in the 200 and 400 mg astaxanthin/kg treatments was significantly higher than that of shrimp in the 0 and 100 mg astaxanthin/kg treatments ($P < 0.05$). We concluded from this experiment that astaxanthin was a necessary ingredient for the development of larval L. vannamei. Considering the effect of astaxanthin on both, growth performance and survival of postlarval L. vannamei, the level of astaxanthin supplemented in the diet should be between 100 mg and 200 mg/kg of diet.

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THE SAFETY AND EFFECTIVENESS OF VARIOUS HYDROGEN PEROXIDE AND IODINE TREATMENT REGIMENS FOR RAINBOW TROUT EGG DISINFECTION

Eric J. Wagner, Randall W. Oplinger, Ronney E. Arndt, Anna M. Forest, Matthew Bartley-2010

North American Journal of Aquaculture 72(1): 34-42

ABSTRACT:
Four tests were conducted to evaluate iodine and hydrogen peroxide for the disinfection of rainbow trout Oncorhynchus mykiss eggs at higher doses for shorter durations than previously studied. In the first test, eyed eggs were exposed to (1) 2,000 mg iodine/L for 10 min, (2) 100 mg iodine/L for 15 min, (3) 30 g hydrogen peroxide/L for 1 min, (4) 6 g hydrogen peroxide/L for 5 min, or (5) no treatment. Iodine (2,000 mg/L) or hydrogen peroxide (30 g/L) significantly reduced bacterial loads on eggs but did not significantly affect egg survival or fry deformity rates. Hydrogen peroxide at 30 g/L for 1 min was generally better for bacterial control than the other treatments, but the 2,000-mg/L iodine treatment also was effective. A second test assessed the effect of hydrogen peroxide on pH at various levels of water hardness. The pH of hydrogen peroxide solutions dropped as total hardness levels decreased, but buffering with at least 1.32 g NaHCO3/L returned pH to approximately neutral levels. In the third test, in which eggs were treated 30 or 60 min postfertilization, there was no significant difference in survival between those treated with 15 g of buffered hydrogen peroxide/L for 2 min and that of the controls. However, at both 30 and 60 min postfertilization, the 2,000-mg/L iodine treatment induced higher levels of egg mortality than in eggs treated with hydrogen peroxide and the controls. In the fourth test, the serial combination of both 30 g hydrogen peroxide/L and 2,000 mg iodine/L was highly lethal if hydrogen peroxide was the first of the two treatments. The survival of eggs treated in the reverse order (iodine first) did not significantly differ from that of controls. These results indicate that hydrogen peroxide was effective in safely reducing the abundance of bacteria on eggs in small-scale tests when buffered, but production-scale experiments with hydrogen peroxide are recommended before implementation of this treatment.
(Utah Division of Wildlife Resources, Fisheries Experiment Station, 1465 West 200 North, Logan, Utah 84321, USA; email of Eric Wagner: ericwagner@utah.gov)

CAN THE LIQUID LIVE MICRO-ORGANISMS SYSTEM, A COMMERCIAL PROBIOTIC, AFFECT SEDIMENT, WATER QUALITY, AND KOI CARP PRODUCTION IN FISH HATCHERY PONDS?

Aaron Barkoh, John M. Paret, Dale D. Lyon, J. Warren Schlechte-2010
North American Journal of Aquaculture 72(1): 50-56
ABSTRACT:
Sediment and turbidity can reduce pond and effluent water quality and fish production. We investigated the efficacy of a commercial bacterial product, Liquid Live Micro-Organisms (LLMO) System, in reducing sediment accumulation and improving water quality and fish production in hatchery ponds for 4.5 months. Four plastic-lined ponds received LLMO treatment at a rate of 1 L per 63,230 L of pond water at 2-week intervals throughout the study and additional twice-weekly applications during the last 6 weeks of the study. Another four ponds were untreated and served as the control. All ponds were cleaned of bottom sediments, supplied with plastic containers (33–34 containers/ha) to collect sediment samples, filled with water, and managed to control Prymnesium parvum ichthyotoxicity. Koi (a variant of the common carp Cyprinus carpio) were stocked into ponds as fry and were fed a commercial diet. Turbidity, Secchi disk visibility, chlorophyll a, pH, ammonia-nitrogen, suspended solids, carbonaceous biochemical oxygen demand, dissolved oxygen, and water temperature were monitored throughout the study. Sediment and fish production data were collected at the end of the study. Statistically, LLMO had no significant effect on sediment accumulation or any of the measured water quality variables and consequently had no effect on fish production. Our results did not support claims or reports that LLMO can reduce sediment accumulation or improve water quality and fish production. Two issues (small sample size and low LLMO application rate) may have confounded our results, thereby preventing us from making firm conclusions on the effects of LLMO on sediments, water quality, and fish production. We recommend that future studies be undertaken to address these issues.
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