ANTHROPOGENIC INFLUENCES ON TERMINAL LAKES AND SEAS
Information provided by Bob Jellison: jellison@lifesci.ucsb.edu

We would like to draw your attention to the upcoming session in the American Geophysical Union 2006 Fall meeting (San Francisco, USA, 11-15 December 2006): "Anthropogenic Influences on Terminal Lakes and Seas: Concerns and Solutions " (session H02).

Saline water bodies contain almost half of all the water in the world's lakes and provide habitat for migratory waterfowl while also providing vast mineral and aquaculture resources. Terminal lakes may be more susceptible to anthropogenic impacts because they can accumulate nutrients and pollutants. Common consequences are contamination, eutrophication, oxygen depletion, desiccation, shrinkage and salinization of the lakes. This often results in severe losses of biological diversity and changes in the ecological community, and triggers a spectrum of economical and social impacts. To a certain degree, this also refers to enclosed and semi-enclosed seas, especially in regions under influence of river discharges. Increased understanding of the hydrology, biology, and geochemistry of such systems is needed to mitigate current and future anthropogenic impacts.

The session will focus on hydrologic and biogeochemical research on terminal aquatic systems and enclosed seas and the application of these research results in identifying anthropogenic influences and the development and implementation of mitigation strategies.

We encourage and welcome all dealing with these and closely related topics to submit an abstract and take part in this session. We are hoping that this session will attract participants from diverse scientific backgrounds working on terminal lakes and enclosed seas from throughout the world.

Further information on the AGU fall meeting as well as the instructions on abstract submission can be found at the meeting web site: http://www.agu.org/meetings/fm06/

PENAEUS VANNAMEI PL STRESS TEST
From: Don Rick don_rick@yahoo.com
To: shrimp@yahoogroups.com
24 May 2006

QUESTION:
After a PCR test we want to select for PLs that are strong enough to grow until harvest size (15 - 20 g). By giving 90%-formaldehyde of 200 ppm to the PL batch holding tank for 30 minutes, some PLs will die and some will survive. The question is, will there be any growth problems in the survivor PLs due to such formaldehyde treatment, provided the culture conditions are ideal?

Don Rick

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COMMENTS 1:
The test is done to a small quantity of pls taken to represent a certain tank of pls.Usualy all the pls after the test is discarded after the results of the stress test. I have not tried keeping the remaining pls for growout. But I don't see the purpose, even if they survived it may indicate that they are strong,but it will die also after a while.The result of the stress test is more important, since you don't want to stock pls that are low in survival.

Alex Wong
alexwongn1@yahoo.com

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COMMENTS 2
It was my mistake to have neglected to mention that the stress test is for the whole population of PLs for later stocking into an earthen pond. My inquiry was initially based on a procedure that's been established in the majority of Indonesian shrimp farms under supervision from Indonesian Department of Oceans and Fisheries (DKP). PLs that come from a hatchery are usually treated with formaldehyde stress test as a whole population. A huge proportion of the population normally survive the test, and then it's up to the quality of the remaining PL population whether or not they will yield high Survival Rate. The question is, could it be confirmed that such test really has no negative effects (say undesirable SR, growth, and physiology) on the survivor PL population throughout the growout period?

Don Rick don_rick@yahoo.com

COMPARISONS OF STRESS PROTEINS AND SOLUBLE CARBOHYDRATE IN ENCYSTED EMBRYOS OF ARTEMIA FRANCISCANA AND TWO SPECIES OF PARARTEMIA
James S. Clegg, Veronica Campagna-2006
Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology 145(2): 119-125
Abstract:
We compared stress proteins (p26, artemin, hsp70) and alcohol-soluble carbohydrates (ASC) in cysts of Artemia franciscana and two as yet un-named species populations of Parartemia, the brine shrimp endemic to Australia. The small stress proteins and molecular chaperones, p26 and artemin, previously thought to be restricted to Artemia, and present in very large amounts in its encysted embryos (cysts), were also detected by western blotting in Parartemia cysts, even though roughly 85–100 million years have passed since these genera diverged. We interpret this finding as further evidence for the adaptive importance of these proteins in coping with the severe stresses these encysted embryos endure. As expected, hsp70 was present in all three groups of cysts, but apparently at somewhat lower concentrations in those of Parartemia. Based on measurements of ASC we propose that the disaccharide trehalose, critical for desiccation tolerance in many animal cells, has probably also been maintained in the metabolic repertoire of Parartemia whose cysts have well developed tolerance to severe desiccation.
Bodega Marine Laboratory and Section of Molecular and Cellular Biology, University of California, Davis, Bodega Bay, CA 94923, USA; email of J.S. Clegg: jsclegg@ucdavis.edu)

QUORUM SENSING-DISRUPTING BROMINATED FURANONES PROTECT THE GNOTOBIOTIC BRINE SHRIMP ARTEMIA FRANCISCANA FROM PATHOGENIC VIBRIO HARVEYI, VIBRIO CAMPBELLII, AND VIBRIO PARAHAEMOLYTICUS ISOLATES
Tom Defoirdt, Roselien Crab, Thomas K. Wood, Patrick Sorgeloos, Willy Verstraete, Peter Bossier-2006
Applied and Environmental Microbiology 72(9): 6419-6423
SHORT REPORT:
Autoinducer 2 (AI-2) quorum sensing was shown before to regulate the virulence of Vibrio harveyi towards the brine shrimp Artemia franciscana. In this study, several different pathogenic V. harveyi, Vibrio campbellii, and Vibrio parahaemolyticus isolates were shown to produce AI-2. Furthermore, disruption of AI-2 quorum sensing by a natural and a synthetic brominated furanone protected gnotobiotic Artemia from the pathogenic isolates in in vivo challenge tests.
(Laboratory of Microbial Ecology and Technology (LabMET), Ghent University, Coupure Links 653, 9000 Ghent, Belgium; email of Willy Verstraete: Willy.Verstraete@UGent.be)

DEVELOPMENT OF A SELF-CLEANING ROTATING DRUM ARTEMIA NAUPLII CONCENTRATOR

Yu-Heng Wu, Yuan-Nan Chu-2006

Aquacultural Engineering 36(1): 51-60

Abstract:
A concentrator is an essential part of the Artemia production system for the concentration, rinsing, and harvesting of the nauplii in commercial hatcheries. Traditional concentration devices such as the plankton screen bags and the welded wedge screen concentrator all have the clogging problem that limits the concentration flow rate and increases the risk of damage of the nauplii. A novel self-cleaning rotating drum Artemia nauplii concentrator has been developed. The rotation of the drum creates a continuous water flow across the filtering screen to wash the nauplii off the screen thus creating an efficient self-cleaning effect that is also safe to the nauplii. The concentrator was tested at three rotation speeds to compare the filtration and survival rates for nauplii densities from 500 to 8000 nauplii ml−1. The rotation of the drum maintained the filtration rate to within 90% of the initial rate at 8000 nauplii ml−1, as compared to only 10% when there was no rotation. At a rotation speed of 40 rpm, the concentrator could process 200 l of nauplii liquid from an initial concentration of 200 nauplii ml−1 to a final concentration of 13,500 nauplii ml−1 in less than 9 min and with a survival rate of more than 99%. The filtration rate per unit screen area of the rotating drum concentrator was more than twice that of the welded wedge screen concentrator and about eight times that of the plankton screen bag. Compared with the other two devices, the rotating drum concentrator has the advantages of a faster and more stable filtration rate, higher final nauplii concentration, non-detectable leakages, and fully automatic operations that could be programmed to suit varying hatchery requirements. The rotating drum concentrator could save time and labor, ensure the safety of the nauplii, and provide the flexibility of unmanned operations and precision control for the automatic production of the Artemia nauplii in the hatcheries.

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TOLERANCE OF STRIPED TRUMPETER LATRIS LINEATA EMBRYOS TO OZONATED SEAWATER

Stephen C. Battaglene, David T. Morehead-2006

Aquaculture International 14(5): 421-429

Abstract:
The tolerance of striped trumpeter, Latris lineata (Bloch and Schneider 1801) embryos to ozonated seawater was examined as a possible means of disinfection. The effect of a range of ozone doses and exposures (CT = concentration × exposure time) was tested at different stages of embryonic development. Three-day-old embryos two-thirds developed around the yolk were exposed for 0.5, 1 or 5 min to ozone concentrations of 0.5, 1, 2 and 5 mg O3 l−1 in a fully orthogonal factorial design. For each treatment there were four replicate 250 ml containers that each received 100 ± 15 embryos. There was no significant difference in hatching success between control-treated embryos or embryos ozonated at 0.5 or 1 mg O3 l−1 for 0.5, 1 or 5 min ($P < 0.05$). However, hatching success was significantly reduced when embryos were treated with 2 or 5 mg O3 l−1 for 5 min or 5 mg l−1 O3 for 1 min ($P < 0.05$). The tolerance of embryos to 0, 0.5 or 2 mg O3 l−1 for 1 min at different stages of development (Day 0, 1, 2, 3 or 4), was then examined. An ozone concentration of 0.5 mg l−1 had no effect on hatching success at any stage of development, but a concentration of 2 mg l−1 significantly reduced hatching success on all days except Day 3. A safe and tested hatchery practise is to disinfect striped trumpeter embryos with 1 mg O3 l−1 for 1 min on Day 3 post-fertilisation when the embryo is two-thirds developed around the yolk.

(Marine Research Laboratories, Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Private Bag 49, Hobart, Tasmania, 7001, Australia; email of Stephen C. Battaglene: Stephen.Battaglene@utas.edu.au)

FISH LARVAE: ZOOPLANKTON RELATIONSHIPS IN MICROCOSM SIMULATIONS OF EARTHEN NURSERY PONDS. II. BRACKISH WATER SYSTEM

Ana Milstein, Arie Valdenberg, Sheenan Harpaz-2006

Aquaculture International 14 (5): 431-442

Abstract:

A simulation of the effects of predation intensity on zooplankton composition in brackish water nursery ponds was carried out in order to address the problem that commercial fish nurseries encounter in obtaining enough zooplankton of adequate species composition and size when fish larvae start to feed. The experimental system consisted of twelve 130 l containers with treatments of four densities (0, 1, 2, or 4 larvae l−1) of common carp (Cyprinus carpio L.), stocked on the 6th day after filling the containers. Zooplankton-environment relationships were explored using factor analysis.

Factor analysis allowed identifying several groups of zooplankters that responded in different ways to fish larvae predation pressure. The first factor represented a general measurement of rotifer abundance, and the second identified the direct effect of size-selective fish predation. Since no rotifers were present in the filling water, all these species were autochthonous populations that hatched from resting forms in the sediment and reproduced. In the absence of fish predation, this led to a steep rotifer increase. Fish predation started when the rotifer concentration was just starting to increase and their direct predation reduced and delayed the rotifer abundance peak. This effect increased with the increase in fish larvae density. Estimations of rotifer consumption by fish larvae in this experiment were higher than similar calculations from data of the literature, which led us to test the hypothesis that factors other than direct predation were affecting rotifer population dynamics. The mechanisms involved in rotifer population regulation are discussed. It was concluded that in commercial nurseries, increased larvae production can be achieved by keeping the larvae density at an intermediate level and stocking fish to match the increasing phase of the rotifer peak. Under reasonable larvae density (up to 2 l−1) it seems that the direct predation effect of fish larvae on rotifer dynamics is minor, compared to fish induced self regulation.

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CHANGES IN THE POPULATION STRUCTURE OF THE LINEAGE ‘NEVADA’ BELONGING TO THE BRACHIONUS PLICATILIS SPECIES COMPLEX, BATCH-CULTURED UNDER DIFFERENT FEEDING REGIMES

Venetia Kostopoulou, Helen Miliou, George Katis, George Verriopoulos-2006

Aquaculture International 14(5): 451-466

Abstract: Two experiments were conducted examining the population structure of Brachionus ‘Nevada’ under feeding conditions commonly applied in hatcheries, using 4-day rotifer batch cultures. In the first experiment two diets were supplied: yeast with Tetraselmis suecica (treatment A) or Culture Selco® with T. suecica (treatment B). The second experiment (treatments C, D, E) differed in the phytoplankton quantity used (20 times higher): treatment C was analogous to A and treatments D and E to B. Initial rotifer density differed among treatments and was about 200 individuals ml−1 in A, C and E, and 60 individuals ml−1 in B and D. Multivariate analysis discriminated A and C from B, D and E. In treatments A and C, a 24-h cycle in ovigerous females, immature individuals and E/F ratio was observed, showing a high reproductive rate. Treatments B, D and E displayed a 48-h cycle in the aforementioned parameters, indicating a lower reproductive rate. The latter treatments had a significantly higher number of females with multiple eggs for most of the samplings, compared to A and C, except for treatment E until 40 h of sampling. Specific growth rate was significantly higher in treatments B and D (Culture Selco® diet) compared to A and C (yeast diet), while treatment E had intermediate rates. Initial rotifer density influenced the abundance of females with multiple eggs, but resulted in slight variations in growth rate and population structure. The type of dry food greatly affected the population structure of rotifers, leading to significant differences in the growth rate.

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EFFECTS OF DECOMPOSING RHIZOPHORA APICULATA LEAVES ON LARVAE OF THE SHRIMP PENAEUS MONODON

B. T. Nga1, R. Roijackers, T. T. Nghia, V. N. Ut, M. Scheffer-2006

Aquaculture International 14(5): 467-477

Abstract: We studied the effects of different concentrations of decomposing Rhizophora apiculata leaves and their leachates on larvae of the shrimp Penaeus monodon under laboratory conditions. Shrimp mortality was highly dependent on the concentration of oxygen in the water, which in turn was strongly correlated to the amount of decomposing leaves in the same water. Shrimps died after 5 min when placed in water containing the highest concentration of mangrove leachates (15 g l−1) tested in our experiments. Shrimp survival and biomass decreased significantly when the shrimp were cultured at the relatively higher concentrations of leaves and leachates (10 and 15 g l−1); in contrast, moderate amounts of leaves or their leachates (2.5–5 g l−1) had positive effects on shrimps. The survival and biomass of shrimps cultured with plastic leaves was lower than those of shrimps cultured with mangrove leaves, indicating that food derived from mangrove leaves contributed to a higher shrimp survival and biomass. These results have important implications for the culture of shrimps in extensive mangrove-shrimp systems. While litter may promote shrimp production, high leaf concentrations may have negative effects due to the drop in the oxygen concentration. Water circulation may help to prevent low oxygen conditions and reduce local accumulations of mangrove leaves.

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MORPHOLOGICAL DEVELOPMENT OF POST HATCH LARVAL GOLDLINED SEABREAM RHABDOSARGUS SARBA (FORSKÅL, 1775)

Fahad S. Ibrahim, Krishen J. Rana, James Stephen Goddard, Issa S. Al Amri-2006

Aquaculture Research 37(12): 1156-1164

Abstract :

Ultrastructural changes in Rhabdosargus sarba larva in early life history were investigated. At hatching, the digestive system was histologically undifferentiated. The digestive tract was a straight tube attached to the dorsal end of the yolk-sac and was not connected to either the mouth or the anus. The layer of gut epithelium at some regions of the luminal surface was straight and microvilli were not present. These straight borders were not observed at 1 day post hatching (DPH) onwards as microvilli increased in number on the luminal surface and became more regular. At 2 DPH, the digestive system was well differentiated and the separation of the mid- and hindgut by the intestino-rectal valve became more advanced. At 0 DPH, the eye was spherical and the retina had a zonation with undifferentiated cells. The eye also lacked differentiated photoreceptors (PR). The retinal PRs increased in length and in number as the yolk-sac was absorbed. By 2 DPH, the eye was fully pigmented, suggesting that the larval vision system was functional. The larvae had a pure cone retina at the onset of exogenous feeding. Morphological and functional differentiation of the digestive tract and the eye of the larvae preceded the completion of yolk and oil globule absorption. The oil globule was exhausted at 4 DPH and at 2 DPH, the yolk-sac was completely absorbed. Food particles were observed at 3 DPH. Food particle ingestion and absorption of the yolk-sac were observed as vision became fully functional.

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DIEL AND ONTOGENETIC BODY DENSITY CHANGE IN PACIFIC BLUEFIN TUNA, THUNNUS ORIENTALIS (TEMMINCK AND SCHLEGEL), LARVAE

Toshinori Takashi, Hirotoshi Kohno, Wataru Sakamoto, Shigeru Miyashita, Osamu Murata, Yoshifumi Sawada-2006

Aquaculture Research 37(12): 1172-1179

Abstract :

Diel and ontogenetic changes in larval body density related to swim bladder volume were investigated in Pacific bluefin tuna, Thunnus orientalis, to determine the causality of larval mortality – adhesion to the water surface and contact with the tank bottom during seedling production. The density of larvae with deflated swim bladders increased with total length and days post hatch. Diel density change was observed after day 2 post hatch; owing to daytime deflation and night-time inflation of the swim bladder, the density was relatively higher during the daytime. Increased swim bladder volumes clearly reduced larval density during the night-time after day 9 post hatch. However, the density of larvae with inflated swim bladders was greater than rearing water density ($\Delta\rho>0.0099$). The small density difference between larvae and rearing water ($\Delta\rho=0.0022-0.0100$) until day 4 post hatch may have caused larval mortality by adhesion to the water surface because larvae can be easily transported to the water surface by aeration-driven upwelling in rearing tanks. Density increased noticeably from day 5 to day 9 post hatch. The increased density difference ($\Delta\rho=0.0065-0.0209$) in larvae and rearing water possibly induced mortality by contact with the tank bottom because larvae sink particularly during the night-time on ceasing swimming.

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LARVAL METAMORPHOSIS AND MORPHOLOGICAL CHARACTERISTIC ANALYSIS OF TRIPLOID SHRIMP FENNEROPENAEUS CHINENSIS (OSBECK, 1765)

Fuhua Li, Chengsong Zhang, Kuijie Yu, Xiaolin Liu, Xiaojun Zhang, Linghua Zhou, Jianhai Xiang-2006

Aquaculture Research 37 (12): 1180-1186

Abstract :

Both MI and MII triploids were successfully produced by heat shock in Chinese shrimp Fenneropenaeus chinensis. The inducing conditions for MI and MII triploids were optimized. The highest inducing rate obtained for MI triploids reached more than 90%, and that for MII triploids reached nearly 100% at the nauplius stage as evaluated using flow cytometry. Comparisons of survival rates at larval stages between triploids and diploids or diploids experiencing treatment and diploids without treatment were performed. At larval stage from nauplii to postlarvae, heat shocks lowered survival at larval stages even if the ploidy was not changed. Ploidy did not affect shrimp larvae survival, and no significant difference was found in the survival of shrimp larvae between MI and MII triploids. Highly significant differences were observed in the morphology of triploids and diploids, and no apparent difference was found in the morphology of MI and MII triploids at the grow-out stages. Discriminating formulae for triploid and diploid shrimp at grow-out stage were developed and could be used to distinguish triploids from diploids based on morphological parameters. MI and MII triploids of shrimp have the potential to be used in aquaculture.

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ISOLATION AND CHARACTERIZATION OF PATHOGENIC VIBRIO ALGINOLYTICUS FROM DISEASED POSTLARVAL ABALONE, HALIOTIS DIVERSICOLOR SUPERTEXTA (LISCHKE)

Junpeng Cai, Hongcao Han, Zhiping Song, Chunxia Li, Jing Zhou-2006

Aquaculture Research 37(12): 1222-1226

Abstract :

Outbreaks of serious mortality among cultured abalone postlarvae have occurred across Southern China since July 2002. Five motile bacterial strains were isolated from diseased abalone postlarvae on tryptic soy agar supplemented with 1% NaCl (TSA1) and/or thiosulphate citrate bile salt (TCBS) sucrose agar plates during an outbreak in August 2003 in Shanwei, Guangdong province. All isolates were characterized and identified as Vibrio alginolyticus on the basis of biochemical characteristics and comparisons with those of the reference strain V. alginolyticus ATCC 17749. Strain 19 (a representative of five similar isolates) was virulent to abalone postlarvae with an LD50 value of1.00 × 104 colony-forming units mL1. All abalone postlarvae exhibited the same signs as in natural outbreaks. The same bacterium could be re-isolated from abalone postlarvae after bacterial challenge using TSA1 and TCBS plates. The results reveal that V. alginolyticus is an infectious agent of abalone postlarvae.
(College of Light Industry and Food Sciences, South China University of Technology, Guangzhou 510640, China; email of J Cai: febjpcai@scut.edu.cn)

USE OF MARINE YEASTS AS AN AVAILABLE DIET FOR MASS CULTURES OF MOINA MACROCOPA
Chang-Keun Kang, Hye Young Park, Mu-Chan Kim, Won Jae Lee-2006
Aquaculture Research 37 (12): 1227-1237
Abstract :
A 4-week feeding trial was conducted to test the use of marine yeasts purified from seawater and sediments as a dietary source in cultivating a cladoceran, Moina macrocopa, a potential alternative live food for fish larvae. Optimal growth conditions of two yeast strains were obtained for NaCl concentration, pH and temperature. Moina macrocopa was cultivated using different diets: marine yeasts (Debaryomyces hansenii Yeast-14 and Candida austromarina Yeast-16) and a commercial diet (Erythrobacter sp. Sπ-I). The essential amino acids of both the yeast strains were nearly as great as those in M. microcopa. Further, the yeast-fed M. macrocopa had essential amino acid profiles similar to the documented values for rotifers and Artemia enriched in microalgae and commercial diets. Erythrobacter sp. Sπ-I lacked n-3 polyunsaturated fatty acids, 20:5n-3 and 22:6n-3, which were also low but detected in both yeasts. An increase in the 20:5n-3 [eicosapentaenoic acid (EPA)] and 22:6n-3 [docosahexaenoic acid (DHA)] levels, compared with the levels in yeast strains themselves, was more pronounced in the 22:6n-3 level of Moina fed the C. austromarina, resulting in a high DHA:EPA ratio. When the Moina diets were switched, their δ13C values shifted gradually towards the values of the switched diets. Diet switch from Erythrobacter sp. Sπ-I to C. austromarina Yeast-16 resulted in a more rapid turnover of Moina tissue carbon than that in the inverse case. When fed a mixed diet, the δ13C values of Moina tissue approached the value of marine yeasts immediately. These temporal changes in the δ13C values of Moina tissue indicate the preferential ingestion of marine yeasts and a selective assimilation of the carbon originated from marine yeasts. These findings suggest that marine yeasts, particularly C. austromarina Yeast-16, are highly available to mass cultures of M. macrocopa, providing better nutritional and dietary values than the commercial diet (Erythrobacter sp. Sπ-I).
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SHORT COMMUNICATION
STIMULATION OF OVARIAN DEVELOPMENT AND SPAWNING IN THE GIANT FRESHWATER PRAWN, MACROBRACHIUM ROSENBERGII (DE MAN)
Sithee Tanboonteck, Praneet Damrongphol, Wandee Poolsanguan-2006
Aquaculture Research 37(12): 1259-1261
(Department of Biology, Faculty of Science, Mahidol University, Rama VI, Bangkok 10400, Thailand; email of P Damrongphol: scpdr@mahidol.ac.th)

EFFICACY OF SELECTION IN SEXUALLY BREEDING ARTEMIA (ARTEMIA FRANCISCANA, KELLOGG, 1906)

Mangesh M Shirdhankar, Palhani C Thomas, Satish K Barve-2006

Aquaculture Research 37(13): 1276-1281

Abstract :

Bi-directional selection for smaller naupliar size (SNS) and bigger naupliar size (BNS) was practiced to develop two divergent lines. The efficacy of bi-directional mass selection in Artemia franciscana was evaluated by comparing the predicted genetic gains with the realized genetic gains. Two sets of predictions were made using two heritability estimates, e.g., the heritability estimate from full-sib analysis (h2) and the estimate from regression of offspring on mid parent (bop). Predictions with the full-sib heritabilities were of very high magnitude as compared with predictions with bop heritabilities. The predictions based on bop were more or less in agreement with realized genetic gain, while the predictions with heritability estimates based on full-sib analysis were much higher than the realized gains. Ratios of realized gain to predicted gain based on full-sib heritabilities were 0.2302 and 0.2152, respectively, for males and females of the SNS line, and 0.0471 and 0.2248, respectively, for males and females of the BNS line. Ratios of realized gain to predicted gain based on bop were 1.5348 and 0.6069 for males and females of the SNS line and 0.1028 and 0.9503 for males and females of the BNS line. Ratios of realized gain to predicted gain based on full-sib heritability were of low magnitude in all the cases as the heritability estimates based on full-sib analysis were inflated by non-additive genetic variance. The ratios of realized gain to predicted gain based on bop were high in both sexes of SNS and females of BNS, indicating high efficacy of selection as bop includes only additive genetic variance. However, it was of low magnitude in BNS males. Thus, the heritability estimates based on regression of offspring on mid parent (bop) are more reliable than that of heritability estimates based on full-sib analysis (h2) for predicting the selection response in Artemia.

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WHOLE-BODY CORTICOSTEROID AND PLASMA CORTISOL CONCENTRATIONS IN LARVAL AND JUVENILE ATLANTIC COD GADUS MORHUA L. FOLLOWING ACUTE STRESS

William King V., David L. Berlinsky-2006

Aquaculture Research 37 (13): 1282-1289

Abstract :

Methods were developed to assess whole-body immunoreactive corticosteroid concentrations (IRC) and plasma levels of cortisol in Atlantic cod subjected to several common, acute stressors. A measurable corticosteroid stress response was observed at the first sampling in whole bodies of 8-day post-hatch (dph) larvae. Two groups of juveniles (5 and 30 g) were subjected to a 30 s net stressor and whole-body IRC and plasma cortisol levels were determined. Post-stressor IRC in smaller fish rose approximately 14-fold, peaked at 1 h, were sustained for 3–6 h and returned to pre-stressor levels within 24 h. Post-stressor plasma cortisol levels in larger fish rose approximately 18-fold, peaked at 0.5–1 h, were sustained for 1–3 h and then returned to near pre-stressor levels after 24 h. Immunoreactive corticosteroid concentrations appeared to remain elevated longer than plasma cortisol levels suggesting that steroids other than cortisol were contributing to total immunoreactivity in homogenates. Juveniles exposed to either a grading procedure or high density transport had maximal IRC and plasma cortisol levels within 90 min which returned to pre-stressor levels within 24–72 h. A reduction in water salinity (20 g L1) did not moderate the corticosteroid response in juveniles. The results show that Atlantic cod respond to common, acute stressors in a manner similar to other teleosts. Whole-body homogenates can be used to identify changes in IRC in response to acute stress in cod with the caveat that recovery IRC may differ from plasma cortisol concentrations.

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HEAT-SHOCK PROTEIN70 GENE EXPRESSION IN FOUR HATCHERY PACIFIC ABALONE HALIOTIS DISCUS HANNAI INO POPULATIONS USING FOR MARKER-ASSISTED SELECTION

Peizhou Cheng, Xiao Liu, Guofan Zhang,Yuewen Deng-2006

Aquaculture Research 37(13): 1290-1296

Abstract :

Heat shock proteins (Hsps) are molecular chaperones that help organisms cope with stressful conditions. Here, we report on the growth rates and Hsp70 expressions in inbred and hybrid populations of abalone Haliotis discus hannai Ino. In abalone, inbred populations expressed more Hsp70 than hybrid populations at all temperatures, except at very high temperatures close to the physiological limit. At benign temperatures, there was a clear trend towards higher Hsp70 expression in inbred than hybrid populations, whereas at higher temperatures, a trend in the opposite direction was observed. The temperature of maximal Hsp70 expression (Tpeak) varied with the population type. The Tpeak of inbred populations (26°C) was lower than that of the hybrid populations (28°C). The maximal inducible Hsp70 of inbred populations was higher than that of hybrid populations. The results showed a trend towards higher expression in inbred population at a lower temperature. These results provide direct experimental evidence that hybrids can cope with the intrinsic stress even at non-stressful temperatures. The constitutive Hsp70 may therefore be used for marker-assisted selection in a breeding programme.

(Institute of Oceanology, Chinese Academy of Sciences, 7 Nanhai Road, Qingdao 266071, China; email of Prof. Guofan Zhang: gfzhang@ms.qdio.ac.cn)

EFFECT OF HYPO- AND HYPER-SALINE CONDITIONS ON OSMOLARITY AND FATTY ACID COMPOSITION OF JUVENILE SHRIMP LITOPENAEUS VANNAMEI (BOONE, 1931) FED LOW- AND HIGH-HUFA DIETS

Miguel A Hurtado, Ilie S Racotta, Olivia Arjona, Mónica Hernández-Rodríguez, Ernesto Goytortúa, Roberto Civera, Elena Palacios-2006

Aquaculture Research 37(13): 1316-1326

Abstract :

Litopenaeus vannamei (Boone) grown in ponds are exposed to salinities of less than 5 g L1 during inland shrimp culture or to more than 40 g L1 from evaporation and reduced water exchange in dry, hot climates. However, dietary requirements for shrimp grown in low or high salinities are not well defined, particularly for fatty acids. Feeding shrimp postlarvae with highly unsaturated fatty acids (HUFA) enhances tolerance to acute exposure to low salinity, as a result of better nutritional status, or/and specific effects of HUFA on membrane function and osmoregulation mechanisms. This study analysed the effect of HUFA supplementation (3% vs. 34%) on L. vannamei juveniles reared for 21 days at low (5 g L1), medium (30 g L1) and high salinities (50 g L1). Juveniles grown at 5 g L1 had lower survival compared with controls (30 g L1) or shrimp grown at 50 g L1, but no significant effect on survival was observed as a result of HUFA enrichment. In contrast, growth was significantly lower for shrimp grown at 50 g L1, but this effect was compensated by the HUFA-enriched diet. Osmotic pressure in haemolymph was affected by salinity, but not by HUFA enrichment. Shrimp fed HUFA-enriched diets had significantly higher levels of eicosapentaenoic acid and docosahexaenoic acid in hepatopancreas and gills. These results demonstrate that growth at high salinities is enhanced with diets containing high HUFA levels, but that HUFA-enriched diets have no effect on shrimp reared at low salinities.

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SHORT COMMUNICATION

EFFECT OF THYROXINE IMMERSION ON LARVAL SURVIVAL, GROWTH AND POSTLARVAE PRODUCTION OF FRESHWATER PRAWN, MACROBRACHIUM ROSENBERGII (DE MAN)

Paymon Roustaian, Lim Ai Gaik-2006
Aquaculture Research 37(13): 1378-1380
(Department of Fisheries and Aquaculture, Faculty of Agrotechnology and Food Science, Kolej Universiti Sains dan Teknologi Malaysia (KUSTEM), Kuala Terengganu, Malaysia; email of P. Roustaian: proustai@unbsj.ca)

DAILY VARIATION IN SHORT-TERM STATIC TOXICITY OF UNIONIZED AMMONIA IN LITOPENAEUS VANNAMEI (BOONE) POSTLARVAE
Francisco Magallón Barajas, Rosalía Servín Villegas, Guillermo Portillo Clark, Joaquín García Mosqueda, Berenice López Moreno-2006
Aquaculture Research 37(13): 1406-1412
Abstract :
Ammonium toxicity of short-duration alkaline events and their variability, as related to 1–30 day-old postlarvae whiteleg shrimp Litopenaeus vannamei (Boone), was assessed by determining medium lethal concentration (LC50) of total ammonium-nitroen (TAN) and NH3-N to 4-h exposures. Exploratory concentrations of TAN were tested at 30°C and pH 9, until mortality from 5% to 95% occurred between 0.9 and 18 mg N L1. To determine the daily variation of ammonium toxicity, 64 lots of 20 postlarvae were exposed to eight different ammonium concentrations (0, 0.9, 3, 6, 9, 12, 15 and 18 mg N L1), in two different environmental scenarios: α (pH 8, 26°C) and β (pH 9, 30°C). In environmental scenario α, ammonium concentrations up to 18 mg L1 pose no short-term mortality risks for ages 1–30 days. In scenario β, mortality was recorded at all ages. The values of LC50 (4 h) for different postlarvae ages have daily variability, ranging from a minimum of 2.54 to a maximum of 6.02 mg L1 of TAN (0.76 and 1.81 mg N L1 of NH3-N), for PL3 and PL19, respectively, with a logarithmic linear tendency to increase with age. Postlarvae mortality at 4 h and 3.0 mg N L1 TAN exposure was lower and less variable in ages greater than 19 days old.
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EFFECT OF DIFFERENT FOOD ITEMS ON THE SURVIVAL AND GROWTH OF FARFANTEPENAEUS PAULENSIS (PÉREZ-FARFANTE 1967) POSTLARVAE
Roberta Soares, Sílvio Peixoto, Wilson Wasielesky, Fernando D'Incao-2006
Aquaculture Research 37 (14): 1413-1418
Abstract :
The effect of different food items on growth and survival was assessed in four feeding experiments conducted consecutively using distinct Farfantepenaeus paulensis (Pérez-Farfante) postlarval growing stages: (1) PL1–PL4 (i.e. from postlarvae 1-day old to postlarvae 4 days old); and (2) PL4–PL10; (3) PL10–PL18 and (4) PL18–PL30. For each trial, 10 feeding treatments were tested in triplicate: Unf, unfed shrimp; Tt, Tetraselmis chuii; Ch, Chaetoceros calcitrans; C, commercial diet; AC, decapsulated Artemia cysts; C+Ph, commercial diet and phytoplankton combination; FA, frozen Artemia nauplii; A, live Artemia nauplii; A+Ph, Artemia nauplii and phytoplankton combination and Mix, mixture of phytoplankton, live Artemia nauplii and commercial diet. Postlarvae feed phytoplankton (i.e. Tt or Ch) exclusively exhibited low growth and survival. The best results for growth and survival were observed in the A, A+Ph and Mix treatments. Frozen Artemia nauplii was found to be suitable for younger postlarvae (PL110), whereas AC may be offered from PL4 to PL30. In general, the present findings indicated that even at an early postlarval stage, F. paulensis presents a high degree of carnivory, and a diet containing Artemia is recommended.
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PANAGRELLUS REDIVIVUS MASS PRODUCED ON SOLID MEDIA AS LIVE FOOD FOR LITOPENAEUS VANNAMEI LARVAE

Ulfert Focken, Christian Schlechtriem, Matthias von Wuthenau, Armando García-Ortega, Ana Puello-Cruz, Klaus Becker-2006

Aquaculture Research 37(14): 1429-1436

Abstract:
The free-living soil nematode Panagrellus redivivus is well known to be an excellent food source for first feeding fish larvae. It represents an alternative to the highly expensive Artemia, which is commonly used. The lack of a proper method for mass production of P. redivivus has prevented its wider use in commercial hatcheries. A new cultivation method allows the production of a sufficient quantity of nematodes to deliver a standardized and permanently available live food of high quality, throughout the larval rearing period. In two experiments – carried out at the Centro de Investigación en Alimentación y Desarrollo, Mexico – several feeding regimes were established to prove the quality of the mass produced P. redivivus for larvae of Litopenaeus vannamei, the Pacific white shrimp. Two different nematode treatments were compared with a no-feed group and a control group that was fed with Artemia. All treatments had an additional algal co-feed and were run in five replicates. Panagrellus redivivus was cultured on two different media (wheat/corn flour and oat flour) to compare these for their suitability as high-quality live food for the larvae. Shrimp fed nematodes grown on wheat/corn medium reached the postlarval stage earlier than those from other treatments. The nematode treatments showed promising results; however, further research is needed on the development of improved culture media or enrichment methods to further increase the nutritional value of P. redivivus.

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CRYOPRESERVATION OF SEA CUCUMBER APOSTICHOPUS JAPONICUS (SELENKA) SPERM

Ming Yu Shao, Zhi Feng Zhang, Li Yu, Jing Jie Hu, Kyoung Ho Kang-2006

Aquaculture Research 37(14): 1450-1457

Abstract :
A simple and convenient method for the cryopreservation of sea cucumber Apostichopus japonicus (Selenka) sperm was tested in the present study. The highest motility (76.7±2.9%) of post-thawing sperm was obtained in 15% dimethyl sulphoxide (DMSO) with a 1:9 dilution (semen volume to DMSO volume) when 0.5 mL semen–DMSO mixture was frozen at 6 cm above liquid N2 in a closed styrofoam box. After thawing, sperm cryopreserved in glycerol almost lost motility entirely. Although there was no significant difference in percentage of motile sperm between 15% and 20% DMSO, the duration of sperm motility of 15% DMSO group was longer than that of 20% DMSO group. The motility of post-thawing sperm enhanced when the dilution ratio of semen increased from 1:1 to 1:9. Morphological changes such as the loss of mitochondria, swollen plasma membrane and broken or rolled-up tails were observed in post-thawing sperm using an eosin–nigrosin staining. The fertility of cryopreserved sperm was significantly lower than that of unfrozen sperm. The 10-fold increase in sperm to egg ratio resulted in double fertility for cryopreserved sperm, and about 70% fertility relative to the control.

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LIGHT INTENSITY EFFECTS ON EARLY LIFE STAGES OF BLACK SEA BASS, CENTROPRISTIS STRIATA (LINNAEUS 1758)

Kimberly A. Copeland, Wade O. Watanabe-2006

Aquaculture Research 37(14): 1458-1463

Abstract :

The effects of four light intensities on growth and survival of first-feeding stage black sea bass larvae Centropristis striata were investigated in a controlled-environment laboratory. Fertilized eggs, obtained from LHRHa-induced spawning of captive broodstock, were stocked (72 eggs L1) into twenty 15 L black tanks under light intensities of 100, 500, 1000 and 1500 lx, with five replicate tanks per treatment. The photoperiod was 12L:12D, the temperature was 20°C and the salinity was 35 g L1. Larvae were fed rotifers Brachionus rotundiformis from day 2 post-hatching (d 2ph) at 5–10 rotifers mL1. Microalgae Nannochloropis oculata and Isochrysis sp. were added (1:1) daily to maintain a density of 300 000 cells mL1. Hatching success and larval growth and survival from d 2ph through d 15ph were monitored. Hatching success was 28–38% under all light intensities, and notochord length at hatching ranged from 2.8 to 3.0 mm, with no significant differences among treatments. By d 15ph, growth (mg wet weight) was significantly higher in the 1000 lx (0.914) and 1500 lx treatments (0.892) than in 100 lx (0.483), and a highly significant trend ($P<0.01$) towards increased survival with increasing light intensities was observed, from 1.3% at 100 lx to 13.9% at 1500 lx. Higher light intensities within the range of 100–1500 lx improved growth and survival of early larval black sea bass, suggesting that even higher light intensities may improve culture performance. This is consistent with conditions in shallow, near-shore locations where eggs and larvae are distributed in nature.
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SALINITY CONTROLS PHYTOPLANKTON RESPONSE TO NUTRIENT ENRICHMENT IN THE GREAT SALT LAKE, UTAH, USA

Amy M. Marcarelli, Wayne A. Wurtsbaugh, Olivia Griset-2006

Can. J. Fish. Aquat. Sci./J. can. sci. halieut. aquat. 63(10): 2236-2248

Abstract:

To examine how salinity and nutrient supply interact to control phytoplankton community composition, nutrient limitation, and dinitrogen (N2) fixation rates in the Great Salt Lake (Utah, USA), we conducted a series of bioassay experiments with plankton from both Gilbert Bay, where salinities are near 160 g·L–1, and Farmington Bay, where salinities range from 10 to 90 g·L–1. Six-day nutrient addition bioassay experiments showed that the extant phyto plankton communities in both bays were limited by nitrogen (N). However, in 28- to 30-day factorial bioassay experiments in which both salinities and nutrient supply were manipulated, phosphorus stimulated chlorophyll a as much as 500% when salinities were less than 70 g·L–1 and N2-fixing cyanobacteria were present. At salinities greater than 70 g·L–1, or with additions of combined N, N2 fixation ceased. When N2-fixing cyanobacteria were absent, the plankton community was routinely N-limited regardless of salinity. The results of these experiments suggest that nutrient limitation of phyto plankton communities may change depending on salinity levels, because salinity controls whether N2-fixing cyanobacteria will be present in the phytoplankton community. Therefore, both salinity and nutrient supply must be considered when making water quality decisions for hypersaline systems such as the Great Salt Lake.
