
INFORMATION OF INTEREST**New IFFO calculations on ratio of wild fish to farmed fish:**

First presented at the US Seafood Summit on February 2nd, 2009 Dr Andrew Jackson of IFFO has clearly demonstrated that the true ratio is 1.7 for salmon, 0.9 for shrimp and 0.5 for all fed aquaculture – in other words it takes today of average 1.7 tons of wild fish to produce 1 ton of farmed salmon, whereas if you look at all farmed fish and shrimp worldwide it takes only ½ ton of wild fish to produce 1 ton of farmed product. This is vastly more efficient than the ratios of 4: 1 or even 5: 1 claimed by Greenpeace and undermines their view - as well as recent media reports - saying that using fishmeal and fish oil for aquaculture is not sustainable.

For more on the misconcepts of fish IN : fish OUT ratios see [IFFO article](#)

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FIRST ANNOUNCEMENT AND CALL FOR PAPERS

**INTERNATIONAL SYMPOSIUM ON AQUACULTURE, BIOLOGY AND MANAGEMENT OF
COMMERCIALY IMPORTANT CRABS – 2009 (ISABMC-2009)**

November 8-11, 2009

Shanghai, China

Hosted by: Shanghai Ocean University and Chinese Crustacean Society

Symposium venue: Conference center, Shanghai Ocean University (new campus).

999 Hucheng Huan Road, Linggang new district, Shanghai, China

Over the past decades, crab aquaculture has emerged as a new industry, driven by increasing market demands and collapses of crab stocks and fisheries worldwide. The collapse of crab fisheries has also prompted stock enhancement efforts in a number of countries. With annual aquaculture production of various crab species approaching 700, 000 tonnes, China is undoubtedly the biggest farmed crab producer in the world and substantial crab restocking programs have also been underway for some time.

Built on crab symposia previously held in Australia, the Philippines and Vietnam, the present conference seeks to bring together international crab scientists and industry stockholders to share

insights into important issues on crab aquaculture, biology and resource management, and to highlight future research needs for the sustainable development of crab aquaculture and fisheries management. The symposium will take place at the new campus of Shanghai Ocean University in Shanghai, China, following the annual meeting of the Chinese Crustacean Society. As a metropolitan city, Shanghai is conveniently located within a short distance to several major crab aquaculture regions in China, including both freshwater mitten crab, saltwater mud crab and swimming crab farms. Field trips to crab farms will be organized to give participants a first hand experience on crab farming in China. A national competition among crab farms for the largest and best quality Chinese mitten crab will also be held at the symposium venue on the first day.

Oral presentations and posters addressing the crab symposium theme are sought, covering the following topics:

- Crab biology
- Broodstock
- Hatchery and Larval Culture
- Nursery and grow-out
- Disease and Nutrition
- Genetics and Selective breeding
- Fisheries, stock enhancement and resource management
- Crab processing and Marketing

Organizing Committee

Honorary Chairmen: Prof. Yingjie Pan, President, Shanghai Ocean University; Prof. Jianhai Xiang, President, Chinese Crustacean Society

Chairmen: Prof. Yongxu Cheng, Shanghai Ocean University, China; Prof. Patrick Sorgeloos, Ghent University, Belgium

Co-Chairmen: Dr. Chaoshu Zeng, James Cook University, Australia; Dr. Lewis Le Vay, University of Wales, Bangor, UK

Abstract submission deadline: June 15, 2009

Please register online at the symposium official website: www.crabconference2009.org or email your filled registration form and abstract (less than 300 words) to ISABMC@crabconference2009.org or shanghai09crabconference@gmail.com. You can also post them to:

The Crab Symposium Organizing committee, Shanghai Ocean University, 999 Hucheng Huan Road, Shanghai 201306, China. Please indicate your preference for oral or poster presentation. For the abstracts submitted for oral presentation, you will be informed whether oral presentation is accepted soon after the submission deadline has passed based on scientific committee evaluation and available of time slots. Please also clearly indicate if you would like to participate in the optional crab farm tour after the symposium (Cost: US\$100 per person).

REAL-TIME PCR ASSAY FOR RAPID DETECTION AND QUANTIFICATION OF VIBRIO AESTUARIANUS IN OYSTER AND SEAWATER: A USEFUL TOOL FOR EPIDEMIOLOGIC STUDIES

Denis Saulnier, Sophie De Decker, Philippe Haffner-2009

Journal of Microbiological Methods 77(2): 191-197

Abstract:

Because *Vibrio aestuarianus* is known to cause serious infections in Pacific oyster *Crassostrea gigas*, a real-time PCR assay was developed targeting the *dnaJ* gene of this bacterium. Only *V. aestuarianus* strains isolated from *C. gigas* mortality events in different geographic areas and the reference strain tested positive, whereas no amplification products was obtained with type strains belonging to 23 other species of *Vibrio*. Sensitivity and reproducibility of the method were assessed using either seawater or oyster homogenate samples spiked with one *V. aestuarianus* strain. All these samples

were stored at $-20\text{ }^{\circ}\text{C}$ in order to mimic retrospective or grouped natural sample analysis without quantification bias due to prolonged freezing. Analysis of standard curves revealed excellent correlation values between light microscopy cell enumerations and PCR Threshold Cycle (Ct) values, and acceptable PCR reaction efficiencies for all type of samples. Quantification curves of both sample types were equivalent, with a detection level as low as $1.6 \cdot 10^2$ *V. aestuarianus* cells in the PCR reaction tube, corresponding to $1.6 \cdot 10^2$ cells ml^{-1} and $1.6 \cdot 10^2$ cells mg^{-1} in seawater and entire oyster samples, respectively, taking into account the dilution factor used for appropriate template DNA preparation. Comparison of PCR assay reproducibility according to the complexity of samples revealed that seawater samples gave more reproducible quantification measures than samples from oyster homogenate, with precision of measured Ct values inferior to 0.4 and 0.6 respectively at 99% confidence. Use of the real-time PCR assay allowed us to monitor *V. aestuarianus* load in oysters naturally infected with this pathogen. Furthermore, we were able to detect *V. aestuarianus* in samples of seawater in which oysters had been reared and in algal cultures used for feeding oysters. Because of the rapidity and reliability of the real-time PCR assay method used in this study, just a few hours are needed compared with the two days required using the classic culture method, this technique will be particularly valuable in mollusc pathology laboratories, for monitoring the source and course of infections by *V. aestuarianus* in pathogenesis and epidemiologic studies, as well as for designing appropriate prophylactic control measures.

(Laboratoire de Génétique et Pathologie, IFREMER, av. du Mus de Loup, 17390 La Tremblade, France; email of Denis Saulnier: denis.saulnier@ifremer.fr)

EFFECT OF VARIOUS DIETARY LEVELS OF DOCOSAHEXAENOIC AND ARACHIDONIC ACIDS AND DIFFERENT N-3/N-6 RATIOS ON BIOLOGICAL PERFORMANCE OF PACIFIC WHITE SHRIMP, *LITOPENAEUS VANNAMEI*, RAISED IN LOW SALINITY

Mayra L. González-Félix, Martín Pérez-Velázquez, Jesús M. Quintero-Alvarez, D. Allen Davis-2009

Journal of the World Aquaculture Society 40(2): 194 – 206

Abstract:

A 3×3 factorial study was conducted to evaluate the effect of three fixed levels of docosahexaenoic acid meal (DHAM) and arachidonic acid meal (ARAM), produced by using a meal that had high levels of the desired fatty acid (0.23% DHAM–0.05% ARAM, 0.50% DHAM–0.10% ARAM, and 0.75% DHAM–0.15% ARAM), and three n-3/n-6 dietary ratios (0.3, 0.8, and 1.8), as well as their potential interaction on growth, survival, and fatty acid composition of hepatopancreas and muscle tissue of juvenile Pacific white shrimp, *Litopenaeus vannamei*, cultured in low salinity. Two additional reference diets with menhaden fish oil or soy and flax oils (n-3/n-6 ratios of 1.8 and 1.7, respectively) were tested. No significant differences (at $P < 0.05$) and no significant interactions were observed among treatments for final weight, weight gain, or survival after 6-wk feeding. This study confirmed that supplementation of DHA and ARA from alternative sources to fish oil is effective in promoting growth and survival of juvenile *L. vannamei*. The fatty acid profile and n-3/n-6 ratio of shrimp tissue reflected that of dietary lipids, although more studies are required to elucidate how the n-3 and n-6 fatty acid balance in the diet relates to shrimp growth.

(Departamento de Investigaciones Científicas y Tecnológicas, Universidad de Sonora, Rosales y Niños Héroes S/N, A.P. 1819, C.P. 83000, Hermosillo, Sonora, México)

EFFECT OF STOCKING DENSITY ON THE GROWTH, SURVIVAL, AND BEHAVIOR OF POSTPUERULUS WESTERN ROCK LOBSTER, *PANULIRUS CYGNUS* (GEORGE) (DECAPODA: PALINURIDAE)

Kane Moyle, Danielle Johnston, Brenton Knott, Roy Melville-Smith, Di Walker-2009

Journal of the World Aquaculture Society 40(2): 255 – 265

Abstract:

The effect of four stocking densities (30, 60, 100, and 150 lobsters/ m^2) on the growth and survival of *Panulirus cygnus* postpueruli was determined over a 112-d grow-out trial. Agonistic behavior at each

experimental density was recorded using infrared filming. Survival and growth decreased with increasing density, although this trend was only significant between the lowest (30/m²) and the highest densities (150/m²) ($P < 0.05$) at the conclusion of the grow-out trial. Density had no significant effect on apparent feed intake but significantly affected food conversion ratios (FCR) across all four densities, with FCR being best at 30/m² and worst at 150/m². The number and frequency of agonistic encounters per tank differed significantly with density, with agonistic encounters being highest at 150/m² and lowest at 30/m². Agonistic encounters coincided with the crepuscular foraging pattern of postpueruli. The reduction in survival and growth of postpueruli at the highest density (150/m²) can be attributed to the significant increase in the number of agonistic encounters. This study supports that *P. cygnus* postpueruli should be stocked at densities less than 100/m² in order to minimize the negative effect of density on growth and survival.

(Department of Botany, The University of Western Australia, Nedlands 6907 Australia)

WHITE SPOT SYNDROME VIRUS QUANTIFICATION IN BLUE CRAB *PORTUNUS TRITUBERCULATUS* HATCHERY-PRODUCED LARVAE AND WILD POPULATIONS BY TAQMAN REAL-TIME PCR, WITH AN EMPHASIS ON THE RELATIONSHIP BETWEEN VIRAL INFECTION AND CRAB HEALTH

Xian-Hong Meng, In-Kwon Jang, Hyung-Chul Seo, Yeong-Roc Cho-2009

Aquaculture 291(1-2): 18-22

Abstract:

The blue crab, *Portunus trituberculatus*, is one of the most important fishery resources in the Yellow Sea of Korea, but the wild stock of this species has been reduced due to over-fishing and the destruction of the natural habitat in this area. Hatchery-produced seeds of blue crab have been released into the sea to enhance stock, but information on viral infection in the larvae as well as wild crabs of this species is very limited. In the present study, TaqMan real-time PCR was applied to quantify white spot syndrome virus (WSSV) in hatchery-produced larvae and wild populations of *P. trituberculatus* in South Korea. Out of 140 *P. trituberculatus* zoea from seven commercial hatcheries, 96.4% were WSSV-positive. The mean WSSV copies were 6.0 per ng DNA, or 3216.0 per larva. In 222 adult crabs from four wild populations captured in different seasons, the WSSV-positive rate was 79.3%, and the WSSV load was 5.2 copies per ng DNA, or 2116.5 copies per mg tissue. Both the WSSV-positive rate and the load of the winter population were significantly lower than those of the other three populations. Statistical analysis showed no significant correlations between WSSV infection loads and growth (CL, CW, and BW). The results suggest that low viral load of WSSV may not affect the growth of *P. trituberculatus* in a wild environment.

(West Sea Mariculture Research Center, National Fisheries Research & Development Institute (NFRDI), Taean, Chungnam 357945, Republic of Korea; email of In-Kwon Jang: jangik@nfrdi.go.kr)

NOVEL APPROACH OF USING HOMOSERINE LACTONE-DEGRADING AND POLY- β -HYDROXYBUTYRATE-ACCUMULATING BACTERIA TO PROTECT ARTEMIA FROM THE PATHOGENIC EFFECTS OF *VIBRIO HARVEYI*

Dang To Van Cam, Nguyen Van Hao, Kristof Dierckens, Tom Defoirdt, Nico Boon, Patrick Sorgeloos, Peter Bossier-2009

Aquaculture 291(1-2): 23-30

Abstract:

Homoserine lactone-degrading and poly- β -hydroxybutyrate-accumulating enrichment cultures (ECs) were obtained using glycerol as C-source and homoserine lactones as N-source, at a high C/N ratio (78). The kinetics of acyl homoserine lactone (AHL) degradation was established and the poly- β -hydroxybutyrate (PHB) content of the obtained ECs was determined. The ECs were characterised through denaturing gradient gel electrophoresis (DGGE) and the main bands were genetically identified by sequence analysis. In a *Vibrio* challenge test using *Artemia* as target organism, a distinct difference in survival of challenged *Artemia* between the treatments with and without the presence of ECs was observed ($53\% \pm 6$; $69\% \pm 5$ and $58\% \pm 8$ versus $4\% \pm 5$; $4\% \pm 5$ and $25\% \pm 21$) in three independent experiments. There was a strong positive correlation between the relative percentage

survival values of *Artemia* and the AHL degradation rate and the PHB content of the ECs. Challenge data with a quorum sensing mutant suggested that the quorum quenching ability of the ECs was less relevant in this *Artemia* model system, pointing to the importance of PHB. The potential of growing these beneficial ECs on glycerol released into the hatching medium of *Artemia* was an asset that still requires validation at hatchery level.

(Research Institute of Aquaculture No. 2 (RIA2), Ho Chi Minh City, Viet Nam; email of Peter Bossier: peter.bossier@ugent.be)

SKELETAL ANOMALIES IN DUSKY GROUPER *EPINEPHELUS MARGINATUS* (LOWE 1834) JUVENILES REARED WITH DIFFERENT METHODOLOGIES AND LARVAL DENSITIES

Clara Boglione, Giovanna Marino, Maurizio Giganti, Alessandro Longobardi, Paolo De Marzi, Stefano Cataudella-2009

Aquaculture 291(1-2): 48-60

Abstract:

The first attempts to reproduce dusky grouper (*Epinephelus marginatus*, Lowe 1834) under controlled conditions started in 1995, but the egg and larvae quality was very low. Mass production is still encountering many difficulties, mainly concentrated in the larval period when very high mortality rates are observed, confirming what has been observed in the rearing of other grouper species. The main bottlenecks have been identified as the difficulty to properly nourish the larvae, stress shock syndrome, and the high deformation rates.

We analysed 633 dusky grouper larvae and juveniles (0.2–7.2 cm total length, TL), sampled during two larval rearing cycles carried out in 2001 and 2002 in Italy. The specimens at different development stages were stained in toto for bone and cartilage and examined for skeletal anomalies during dusky grouper ontogenesis. The incidence of anomalies in groupers hatched from the same egg batch but reared using two different methods (green waters and semi-intensive rearing) and three stocking densities (8, 16 and 28 larvae/l) was compared, with a view to providing tools for identifying the most appropriate larval rearing method in order to at least limit the onset of skeletal anomalies.

Our results suggest that during development no particular skeletal anomaly patterns (or fate) can be clearly identified as a high variability was observed in malformation typologies and the regions affected.

No significant differences in the morphological quality between groupers reared using semi-intensive (LV02 lot) and green water (GW02-01 lot) methodologies were observed, whilst groupers reared at the highest stocking density (28 larvae/l) showed the highest frequency of deformed individuals (75.8%), the highest malformation charge (average of 5.5 anomalies per deformed individual), the largest range of anomaly typologies (38), and the highest incidence of individuals with at least one severe anomaly (30.9%). Whilst in green waters no evident effects of larvae density were observed on survival rates, the survival rate in large volume reared individuals (17.5%) was considerably higher with respect to those reared in green waters (0.2%) at 7–8 larvae/l. This indicates that the semi-intensive methodology should be considered more effective in enhancing the survival rate of dusky grouper larvae.

(Experimental Ecology and Aquaculture Laboratory, Department of Biology, University of Rome 'Tor Vergata', Via della Ricerca Scientifica, 00133 Rome (RM), Italy; email of C. Boglione: boglione@uniroma2.it)

THE ACCUMULATION OF SUBSTANCES IN RECIRCULATING AQUACULTURE SYSTEMS (RAS) AFFECTS EMBRYONIC AND LARVAL DEVELOPMENT IN COMMON CARP *CYPRINUS CARPIO*

Catarina I.M. Martin, Marco G. Pistrin, Stephan S.W. Ende, Ep H. Eding, Johan A.J. Verreth-2009

Aquaculture 291(1-2): 65-73

Abstract:

The accumulation of substances in Recirculating Aquaculture Systems (RAS) may impair the growth and welfare of fish. To test the severity of contaminants accumulated in RAS, early-life stages of fish were used. Ultrafiltered water from two Recirculating Aquaculture Systems (RAS), one RAS with a high accumulation of substances (water exchange rate 30 L/kg feed/day) and one RAS with a low accumulation of substances (water exchange rate 1500 L/kg feed/day), was used to incubate eggs and rear larvae of common carp *Cyprinus carpio*. A broad range of read-out parameters was used to determine the effect of accumulation level on the development of the early-life stages; from hatching dynamics to larvae length and dry weight. The water quality (temperature, pH, dissolved O₂, conductivity, total bicarbonate, ortho-phosphate-P, TAN, NO₂--N, NO₃--N and minerals) was compared between the 2 treatments. Carp eggs developing in the high-accumulation water had higher mortality percentages (both for eggs and larvae), reduced hatching percentages, delayed hatching dynamics and reduced larvae length and body weight. However, these larvae exhibited fewer deformities than larvae incubated in the low-accumulation water. Furthermore, an accelerated development both of the embryo (appearance of heart beat, pectoral fin bud and tail movement) and yolk-sac larvae (depletion of the yolk sac) was observed in the high-accumulation water. The high-accumulation water had significantly lower pH and higher conductivity, NO₂--N, NO₃--N and ortho-phosphate-P. Most of the minerals (As, Cu, Mn, Ni, Zn, K, Mg, Na, P and S) including heavy metals, were present at a higher concentration in the high-accumulation water. The influence of these parameters on the embryonic and larval development of fish is discussed. It is suggested that in the high-accumulation water, the concentration of ortho-phosphate-P, nitrate and of the heavy metals arsenic and copper is likely to have impaired the embryonic and larval development and therefore deserves further research as potential growth inhibiting factors in RAS.

(Aquaculture and Fisheries Group, Wageningen University, P.O. Box 338, 6700 AH, Wageningen, The Netherlands; email of C. Martins: catarina.martins@wur.nl)

POST MORTEM CHANGES IN THE CONCENTRATION OF FREE AMINO ACIDS IN ARTEMIA FRANCISCANA AT DIFFERENT TEMPERATURES

Jon Gulbrandsen, 1, Bjørn Bjerkgeng, Jihye Kim, Thomas M. Scott, Michael B. Rust-2009
Aquaculture 291(1-2): 111-114

Abstract:

Post mortem proteolysis of *Artemia franciscana* in terms of free amino acid (FAA) concentrations was determined at several temperatures to indicate potential nutritive value. The experiment was conducted for 400 min at 12, 16, 20, 24 and 28 °C to correspond to gut passage times and temperatures expected in the gut of cold-water fish larvae through tropical fish larvae. After death, FAA concentration in *A. franciscana* nauplii reached a maximum about 2–2.5-fold higher than the initial concentration after 120 min at 16, 20, 24 and 28 °C. At 12 °C the maximum concentration of FAAs was achieved after 240 min. A significant effect of temperature on total FAAs (df = 4, F-value = 17.17, P < 0.0001, ANOVA), indicated that the most pronounced proteolysis took place at 20 °C. Only small, albeit significant (P < 0.05) differences were observed in FAA composition as influenced by temperature and duration of the proteolysis. The FAA composition of the freshly killed initial sample also differed from all treated samples. Our interpretation of these results is that there is considerable autolytic proteolysis during residence times that are possible in fish larvae, and that this may represent a significant contribution to FAAs for energy supply and protein synthesis.

(Northwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 2725 Montlake Blvd. E, Seattle, WA 98112, USA; email of B. Bjerkgeng: bjorn.bjerkeng@sunndals.net)

MICROSATELLITES REVEALED NO GENETIC DIFFERENTIATION BETWEEN HATCHERY AND CONTEMPORARY WILD POPULATIONS OF STRIPED CATFISH, PANGASIANODON HYPOPTHALMUS (SAUVAGE 1878) IN VIETNAM

Hung Phuoc Ha, Thuy Thi Thu Nguyen, Supawadee Poompuang, Uthairat Na-Nakorn-2009
Aquaculture 291(3-4): 154-160

Abstract:

Aquaculture of the striped catfish, *Pangasianodon hypophthalmus* (Sauvage 1878), in Vietnam has become one of the fastest growing primary food production sectors in the world. Although a demand on quantity of fingerlings is currently reached, it is likely that the long term quality of the stocks may be uncertain due to lacking of genetic broodstock management measures. The present study employed five microsatellite loci to investigate levels of genetic variation of the striped catfish of the current wild stocks as well as of the selected hatcheries in Vietnam. The study included four hatchery populations and two wild populations spawned in 2005 in the Mekong and Bassac Rivers, and one wild population (spawned in 2006) in the Bassac River. The results showed no genetic differentiation among populations as revealed by FST and a model-based clustering method. AMOVA also showed no genetic differentiation between pooled wild and pooled hatchery populations while variation within groups was significant. Genetic variation of wild (mean number of alleles per locus, $A = 4.80-6.20$; allelic richness, $Ar = 4.54-5.06$; mean effective number of alleles per locus, $Ae = 2.86-3.20$; observed heterozygosity, $Ho = 0.62-0.65$; expected heterozygosity, $He = 0.62-0.64$) and hatchery populations ($A = 4.60-5.20$; $Ar = 4.10-4.83$; $Ae = 2.80-3.11$; $Ho = 0.61-0.66$; $He = 0.61-0.64$) were not statistically different. There were no evidences for recent genetic bottleneck in all populations. Therefore it is implied that the hatchery stocks of striped catfish in Vietnam were founded from sufficient numbers of brooders and current population size is large. The domestication process is in an early stage.

(Faculty of Aquaculture and Fisheries , Can Tho University, Cantho, Vietnam; ffisurn@ku.ac.th)

WEANING OF JUVENILE SEAHORSES *HIPPOCAMPUS ERECTUS* PERRY, 1810 FROM LIVE TO FROZEN FOOD

Qiang Lin, Junda Lin, Dong Zhang, Yanbo Wang-2009

Aquaculture 291(3-4): 224-229

Abstract:

In this study, the weaning of juvenile seahorses *Hippocampus erectus* from live *Artemia* to frozen *Mysis* spp. at different ages and sizes was evaluated as a means of improving commercial culture efficacy. The incremental increases in wet weight and standard length of the 42, 49, 56, 63 and 70 day-post-partum juvenile seahorses over a 14-day period were significantly different ($F_{4, 45} = 47.359$, $F_{4, 45} = 32.108$, $P < 0.05$), with 70 day-post-partum juveniles having highest specific growth rate (SGR) and weight gain (WG), at 5.7 ± 1.2 and $122.3 \pm 18.7\%$, respectively. Wet weight decreased in juveniles of 42 and 49 day-post-partum at 4–6 days after being weaned. The incremental growth rate of the same age juveniles of different body sizes also differed significantly ($F_{3, 36} = 27.185$ in wet weight, $F_{3, 36} = 19.424$ in standard length, $P < 0.05$); the larger the juveniles, the higher their SGR and WG. The difference in body size and wet weight between the large size and small size juveniles increased after weaning to *Mysis* spp., with daily growth rate in wet weight 0.07 ± 0.003 g/day in large juveniles and 0.02 ± 0.004 g/day in small juveniles from 63 to 112 days post-partum. Body size and wet weight of the juveniles appear to be an important factor in deciding an appropriate time for weaning in commercial seahorse culture. The present study suggests that for juvenile *H. erectus*, weaning to frozen food should occur at approximately 0.54–0.70 g in wet weight or 6.59–7.46 cm in standard length.

(Key Laboratory of Tropical Marine Environmental Dynamics, South China Sea Institute of Oceanology, Chinese Academy of Sciences, Guangzhou 510301, PR China; email of Qiang Lin: linqiangzsu@163.com)

SHORT COMMUNICATION

DETECTION AND PERSISTENCE OF LYMPHOCYSTIS DISEASE VIRUS (LCDV) IN ARTEMIA SP

I. Cano, B. Lopez-Jimena, E. Garcia-Rosado, J.B. Ortiz-Delgado, M.C. Alonso, J.J. Borrego, C. Sarasquete, D. Castro-2009

Aquaculture 291(3-4): 230-236

Abstract:

Lymphocystis disease virus (LCDV) was detected by PCR-hybridisation in Artemia cysts and metanauplii, and the infectivity of these viral particles was confirmed by inoculation on SAF-1 cells. Viral genome and antigens have been detected by whole-mount in situ hybridisation (ISH) and immunofluorescence assay (IFA) in the digestive tract of nauplii hatched from LCDV-contaminated cysts, but not at the umbrella and instar I stages. Instar II nauplii also became LCDV-contaminated after bath challenge. LCDV was detected by ISH and immunohistochemistry (IHC) in the digestive tract and in some cells in the ovisac of adults reared from LCDV-positive instar II nauplii. Reproductive cysts arising from LCDV-contaminated Artemia breeders, as well as their offspring nauplii, were also LCDV-positive. No viral genome and antigens were detected in the eggs, which may indicate an external cyst contamination during spawning. Moreover, viral DNA on cysts disappears by the decapsulation treatment, which may be applied to prevent the transmission of LCDV in Artemia. Infective LCDV particles persist along crustacean life cycle, as demonstrated by cell culture. These findings suggest that Artemia might act as a reservoir of LCDV, although further studies are necessary to establish its role as a vector of this virus to cultured fish.

(Instituto de Ciencias Marinas de Andalucía, CSIC, Puerto Real, 11501 Cádiz, Spain; email of D. Castro: dcastro@uma.es)

NEW AQUACULTURE SPECIES—THE WHITEFISH MARKET

Frank Asche, Kristin H. Roll, Trine Trollvik-2009

Aquaculture Economics & Management 13(2): 76 - 93

Abstract:

Aquaculture production has increased rapidly during the last three decades. This is due to increased production of established species as well as a continuous introduction of new species. Productivity growth is the main engine for the increased production in aquaculture, and as the accumulated knowledge is applied to new species and in new regions, production is expected to continue to increase. Along with the production growth an increasing quantity of aquaculture products is being internationally traded. This is rapidly changing several segments of the global seafood market. While high value species such as salmon and shrimp were the first to be traded internationally, low cost species like tilapia and pangasius are currently transforming large parts of the whitefish market.

(Department of Industrial Economics, University of Stavanger, Norway)

PATTERNS OF GROWTH OF JUVENILE PINK ABALONE HALIOTIS CORRUGATA FED RE-HYDRATED NATURAL FEEDS AT A LABORATORY AND A HATCHERY

E. Serviere-Zaragoza, A. Mazariegos-Villarreal, T. Reynoso-Granados, R. Robles-Hernandez, P. Monsalvo-Spencer, G. Ponce-Diaz, A. Castro, A. Hernandez-Llamas-2009

Aquaculture Nutrition 15(3): 241 – 246

Abstract:

The feasibility of obtaining a similar growth response from juvenile pink abalone *Haliotis corrugata* at a research laboratory and a hatchery, when using natural feeds was evaluated. Four macroalgae, *Egria menziesii*, *Eisenia arborea*, *Macrocystis pyrifera*, *Gracilaria* sp., and the surfgrass *Phyllospadix torreyi* were used as feeds. Response patterns of abalone were very similar at both facilities in terms of final length, weight, and survival, varying from 13.0 to 15.50 mm, 0.31 to 0.52 g, and 60.0% to 78.6%, respectively. Better growth was obtained when *E. menziesii*, *M. pyrifera*, and *Gracilaria* sp. were offered. Poor results were obtained with surfgrass. The feed conversion ratio was determined at the laboratory and did not vary significantly, ranging from 42.3 to 199.0; although a significant inverse correlation was observed with growth rate. Growth in length and weight and survival rates varied within 1.6–20.2 $\mu\text{m day}^{-1}$, 0.123–1.664 mg day^{-1} , 0.4–0.64% day^{-1} , respectively. Mean growth rate in length (14.7 $\mu\text{m day}^{-1}$) and weight (1.18 mg day^{-1}) at the hatchery were significantly higher than that obtained at the laboratory (9.4 $\mu\text{m day}^{-1}$ and 0.77 mg day^{-1}), which is most likely a consequence of more suitable water temperature at the hatchery. Mean survival rate was significantly higher at the laboratory (53.1% day^{-1}) than at the hatchery (46.1% day^{-1}).

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EVIDENCE OF DENSITY- AND SIZE-DEPENDENT MORTALITY IN HATCHERY-REARED JUVENILE WHITE STURGEON (*ACIPENSER TRANSMONTANUS*) IN THE KOOTENAI RIVER

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Abstract:

We evaluated effects of stocking level and size-at-release on survival rates of hatchery-reared juvenile white sturgeon (*Acipenser transmontanus*) in the Kootenai River using Cormack–Jolly–Seber and related models implemented in Program MARK. A total of 119 768 marked and unmarked hatchery juveniles were released from 1992 to 2006, of which 2938 passive integrated transponder (PIT)-tagged fish were subsequently recaptured. Annual survival rates of marked groups ranged from 0.01 to 0.84 (mean = 0.45) during the first year at large, from 0.48 to 1.0 (mean = 0.84) in the second year, and averaged 1.0 during all subsequent years. First year survival rates declined substantially in recent years, particularly for small fish (<25 cm fork length). Approximately 59% of the variation in first year survival was explained by a negative relationship with estimated juvenile abundance (linear regression, $P < 0.01$). Length-at-release of individuals explained a substantial proportion of the within-year variation in survival during the first year at large. Our results provide strong evidence of density- and size-dependent mortality in hatchery-reared juvenile white sturgeon in the Kootenai River. Management actions that prioritize the release of fewer, larger-sized fish will likely improve first year survival rates and subsequent recruitment to the spawning-age population.
