

INFORMATION OF INTEREST

- Sustainable Aquaculture on Tropical Islands - Tahiti Aquaculture 2010, December 6-11: [online presentations](#)
- SeaFood Summit 2011, Jan 31 – Feb 2, Vancouver – Canada: [website with presentations](#)
- ACIAR-SPC Asia-Pacific Tropical Sea Cucumber Aquaculture Symposium. 15-17 February 2011. Noumea, New Caledonia – [pdf of presentations](#)
- Guide to Using Drugs, Biologics, and Other Chemicals in Aquaculture. American Fisheries Society 2011. Download [pdf](#) and [xls](#) file
- New [FAO document](#): Ecosystem approach to aquaculture. FAO Technical Guidelines for Responsible Fisheries. No. 5, Suppl. 4. Rome, FAO. 2010. 53p.
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REPLACEMENT OF LIVE PREY BY FORMULATED DIETS IN LARVAL REARING OF SPIDER CRAB MAJA BRACHYDACTYLA

Mireia Andrés, Guiomar Rotllant, Marta Sastre, Alicia Estévez-2011

Aquaculture 313(1-4): 50-56

Abstract:

Preliminary experiments on the replacement in live prey by a formulated microbound diet (MBD) were carried out during larval development of the spider crab, *Maja brachydactyla*. Four levels (25, 50, 75 and 100%) of replacement of live prey (enriched *Artemia metanauplii*, EAM) were tested throughout larval development (zoea I = ZI, zoea II = ZII and megalopa = M). Replacement of up to 50% had no significant effect on the growth rate and survival of the larvae during any stage. Total replacement (100% MBD) resulted in a decrease in larval dry weight suggesting a poor assimilation of the proteins and lipids of the MBD. Survival of the larvae fed with the MBD did not appear to be affected, as it was significantly higher than the unfed control. Digestive enzyme activity (protease and amylase) of the larvae was probably influenced by both the physiological response to the formulated diet and larval ontogenetic changes. Further research is needed to improve MBD digestibility and to establish the lipid requirements of the larvae.

(IRTA, Sant Carles de la Ràpita, Ctra. Poble Nou Km. 5.5, 43540, Sant Carles de la Ràpita (Tarragona), Spain ; email of Mireia Andrés : mireia.andres@gmail.com)

STORAGE OF UNFERTILIZED RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) EGGS IN SEALED POLYETHYLENE (PE) BAGS

Marina Komrakova, Wolfgang Holtz-2011

Aquaculture 313(1-4): 65-72

Abstract:

Seven experiments were conducted in an effort to establish ways of optimizing storage conditions for unfertilized rainbow trout eggs. Eggs in coelomic fluid with antibiotics added were stored at 2 ± 1 °C

for various periods before being inseminated with cryopreserved spermatozoa and incubated to the eyed stage. The proportion of eggs reaching the eyed stage, relative to freshly collected eggs, was used as the parameter for effective storage. In the first two experiments (Exps. 1 and 2), eggs were stored in vials that were uncovered or covered with a special tissue culture membrane "BioFolie 25" or polyethylene (PE) freezer bag material. Regardless of the material used, covering of the vials did not impair fertilization rate of stored eggs. During subsequent experiments (Exps.3–7), eggs were packaged in sealed PE bags rather than storing them in vials. In bags, no effect on fertilization capacity by various surrounding gas atmospheres (air, exhaled air, oxygen or nitrogen) was observed; carbon dioxide, on the other hand, was extremely detrimental. Heat sealing of packets, size of packet and mass of the eggs on top of those at the bottom of a packet had no effect ($P > 0.05$). Handling of eggs at room temperature was unproblematic for up to 1 hour. If in direct contact with the gas atmosphere, eggs retained their fertilization capacity longer under air than under oxygen; if several layers of eggs were involved, however, oxygen was indicated. Direct exposure to nitrogen and, more so, carbon dioxide brought about a drop in pH and was detrimental. It appears that inside an egg packet there is sufficient oxygen present in a dissolved state to maintain fertilization capacity at a reasonable level for more than three weeks, provided the carbon dioxide concentration does not increase and cause a decline in pH. Due to the selective permeability of PE for carbon dioxide, the pH inside egg packets remained neutral. Therefore chilled storage of unfertilized rainbow trout eggs in sealed PE bags is particularly effective. After 20 days, fertilization rates of more than 50% were recorded. With no necessity for an air space or oxygen supply and no risk of spillage or dehydration, PE egg packets, being space-saving and convenient to handle, are suitable for storing and can be further applied for shipping of unfertilized rainbow trout eggs.

(Department of Animal Science, Georg-August-University, Albrecht-Thaer-Weg 3, 37075 Goettingen, Germany; email of Marina Komrakova: komrakova@yahoo.com)

OOCYTE QUALITY INDICATORS IN EURASIAN PERCH, *PERCA FLUVIATILIS* L., DURING REPRODUCTION UNDER CONTROLLED CONDITIONS

Daniel Źarski, Katarzyna Palińska, Katarzyna Targońska, Zoltán Bokor, László Kotrik, Sławomir Krejszef, Krzysztof Kupren, Ákos Horváth, Béla Urbányi, Dariusz Kucharczyk-2011
Aquaculture 313(1-4): 84-91

Abstract:

This study examined embryo survival and viability of Eurasian perch, *Perca fluviatilis* L., larvae in relation to the fragmentation of oil droplets in ovulated oocytes. The study was conducted after controlled reproduction. Four (I–IV) categories of egg-ribbons quality were distinguished, based on the degree of oil droplet fragmentation (where at least one oil droplet with minimum 0.39 mm diameter were certified in all oocytes in egg-ribbon — categories I and II) and percentage of eggs with highly fragmented oil droplets (where diameter of oil droplets did not exceed 0.35 mm — categories III and IV) in the egg-ribbon. The dynamics of survival and some morphological parameters were investigated during embryonic and larval development up to 10 days post-hatch (DPH), under laboratory conditions. The laboratory-obtained results were compared to semi-commercial incubation and initial larval rearing. The fragmentation of oil droplets was accompanied by a decrease in egg quality. Oil droplets were found to coalesce after activation of eggs in water and during incubation process. Thus, the presented categorization may be used in non-activated eggs only. In both experiments, at 10 DPH the percentages of feeding larvae and those with an inflated swim bladder were recorded. The best results of laboratory-conducted incubation were obtained in category I and II (92.80 and 74.20% in the eyed-egg stage respectively). In category IV, the mortality rate of embryos exceeded 90%. The highest body deformation rate of freshly hatched larvae was observed in category III (67.86%) and IV (86.14%) that was related with fragmentation of oil droplets. These results were confirmed under semi-commercial conditions. The obtained results indicate that the proposed categorization may be a valuable tool for the quality evaluation of Eurasian perch egg-ribbons. It could be successfully applied in both commercial fish production and scientific activity.

(Department of Lake and River Fisheries, University of Warmia and Mazury, Olsztyn, Poland; email of Daniel Źarski: danielzarski@interia.pl)

AUTOMATIC MEASUREMENT OF *ACARTIA TONSA* NAUPLII DENSITY, AND ESTIMATION OF STAGE DISTRIBUTION

Morten Omholt Alver, Werner Storøy, Tora Bardal, Ingrid Overrein, Mathias Karlsen, Onsøyen, Torodd Tennøy, Gunvor Øie-2011

Aquaculture 313(1-4): 100-106

Abstract:

Copepods are increasingly seen as an important feed in the culture of marine fish. Calanoid species such as *Acartia tonsa* have been studied for mass culture purposes. In this work, a plankton counter developed for automatic measurement of density in rotifer (*Brachionus plicatilis*) cultures has been tested for *Acartia* nauplii. The plankton counter, after adaptation, can estimate both the size and density of the nauplii within reasonable margins of error. Size estimates were validated against measurements made by microscope, and density estimates against manual counts.

The plankton counter makes it possible to automatically monitor metrics like hatching success, mortality and development rate in *Acartia* cultures, as well as monitoring of densities in larval first feeding tanks. The latter opens the opportunity for appetite based feeding of larvae. The area measurement can be used to estimate the biomass and the development stage of the nauplii.

(Department of Engineering Cybernetics, Norwegian University of Science and Technology, Odd Bragstads plass 2D, 7491 Trondheim, Norway; email of Morten Omholt Alver: Morten.Alver@sintef.no)

EXPRESSION OF FATTY ACYL DESATURASE AND ELONGASE GENES, AND EVOLUTION OF DHA:EPA RATIO DURING DEVELOPMENT OF UNFED LARVAE OF ATLANTIC BLUEFIN TUNA (*THUNNUS THYNNUS* L.)

Sofia Morais, Gabriel Mourente, Aurelio Ortega, Jamie A. Tocher, Douglas R. Tocher-2011

Aquaculture 313(1-4): 129-139

Abstract:

The concentration of n-3 long-chain polyunsaturated fatty acids (LC-PUFA) in neural tissues is known to be crucial for effective prey capture from the time of first feeding in marine fish larvae. Furthermore, tissues of tunids, including Atlantic bluefin tuna, have relatively high levels of DHA (docosahexaenoic acid, 22:6n-3) and a high ratio of DHA:EPA (eicosapentaenoic acid; 20:5n-3) compared to most other species. Although the lipid biochemistry underpinning the high DHA:EPA ratio in tuna is unclear, it has been generally assumed that they must selectively accumulate and retain DHA in their tissues. In the present study, we investigated lipid and fatty acid metabolism during early development of Atlantic bluefin tuna and determined the changes in lipid content, lipid class composition and total, phospholipid and neutral lipid fatty acid profiles in unfed larvae during yolk sac utilization. In addition, we studied the LC-PUFA biosynthesis pathway by quantifying expression of fatty acyl desaturase and elongase genes. To this end, we cloned and functionally characterized two cDNAs by heterologous expression in yeast, showing them to code for a $\Delta 6$ desaturase and Elovl5 elongase, respectively, that could both be involved in the conversion of EPA to DHA. The level of DHA was maintained, but the proportion of EPA declined, and so the DHA:EPA ratio increased in bluefin tuna larvae during yolk sac utilization. Although this could be the result of relative retention of DHA during a period of generally high fatty acid oxidation and utilization, there was also a great increase in desaturase and elongase expression with larval development. This suggests that increased activity of these enzymes is important for the normal development of tuna larvae related to the provision of adequate DHA for the formation of biomembranes, particularly in neural (brain and eye) tissues.

(Institute of Aquaculture, University of Stirling, FK9 4LA Stirling, Scotland, UK; email of Sofia Morais: sofia.morais@stir.ac.uk)

METABOLIC RESTRUCTURING DURING ENERGY-LIMITED STATES: INSIGHTS FROM ARTEMIA FRANCISCANA EMBRYOS AND OTHER ANIMALS

Hand S.C., Menze M.A., Borcar A., Patil Y., Covi J.A., Reynolds J.A., Toner M.-2011

J. Insect Physiol.

Abstract:

Many life history stages of animals that experience environmental insults enter developmental arrested states that are characterized by reduced cellular proliferation, with or without a concurrent reduction in overall metabolism. In the case of the most profound metabolic arrest reported in invertebrates, i.e., anaerobic quiescence in *Artemia franciscana* embryos, acidification of the intracellular milieu is a major factor governing catabolic and anabolic downregulation. Release of ion gradients from intracellular compartments is the source for approximately 50% of the proton equivalents needed for the 1.5 unit acidification that is observed. Recovery from the metabolic arrest requires re-sequestration of the protons with a vacuolar-type ATPase (V-ATPase). The remarkable facet of this mechanism is the ability of embryonic cells to survive the dissipation of intracellular ion gradients. Across many diapause-like states, the metabolic reduction and subsequent matching of energy demand is accomplished by shifting energy metabolism from oxidative phosphorylation to aerobic glycolysis. Molecular pathways that are activated to induce these resilient hypometabolic states include stimulation of the AMP-activated protein kinase (AMPK) and insulin signaling via suite of *daf* (dauer formation) genes for diapause-like states in nematodes and insects. Contributing factors for other metabolically-depressed states involve hypoxia-inducible factor-1 and downregulation of the pyruvate dehydrogenase complex. Metabolic similarities between natural states of stasis and some cancer phenotypes are noteworthy. Reduction of flux through oxidative phosphorylation helps prevent cell death in certain cancer types, similar to the way it increases viability of dauer stages in *Caenorhabditis elegans*. Mechanisms that underlie natural stasis are being used to pre-condition mammalian cells prior to cell biostabilization and storage.

(Division of Cellular, Developmental and Integrative Biology, Department of Biological Sciences, Louisiana State University, Baton Rouge, LA 70803 USA)

REVIEW

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON NATIONAL FISH HATCHERY OPERATIONS IN THE PACIFIC NORTHWEST, USA

Aquatic Environment Interactions 1(3): 175-186

Kyle C. Hanson, Kenneth G. Ostrand-2011

ABSTRACT: Global climate change is predicted to be a major force in altering ecosystem processes and animal behavior worldwide in the coming years. Currently, many Pacific salmon *Oncorhynchus* spp. stocks are imperiled due to harvest, habitat loss, and anthropogenic disturbance across much of their native range, and climate change has been predicted to have further negative effects on these species. Artificial propagation has been used by multiple resource agencies to conserve salmon populations and increase numbers in the Columbia River watershed, including the National Fish Hatchery (NFH) system in the Pacific Northwest, which annually produces more than 60 million juvenile Pacific salmonids. The species and populations that are supplemented through the NFH system, as well as operations at the NFHs themselves, will be affected by global climate change and forced to adapt. This review provides a preliminary summary of the potential effects of climate change on the NFH system in the Pacific Northwest, focusing on the topics that will be of most relevance to NFH operations. A series of proactive measures, which are in various stages of action, are outlined that should quantify climate change threats to the operations of specific NFHs and allow for flexibility in adjusting operations to continue to meet conservation and supplementation goals in the face of an uncertain future.

(U. S. Fish and Wildlife Service, Abernathy Fish Technology Center, 1440 Abernathy Creek Rd., Longview, Washington 98632, USA; email of Kyle C. Hanson: kyle_hanson@fws.gov)

EFFECT OF THREE DIETS ON GROWTH AND SURVIVAL RATES OF AFRICAN CATFISH HETEROBRANCHUS BIDORSALIS LARVAE

Yao Laurent Alla, Ble Melecony Célestin, Atse Boua Célestin, Kone Tidiani-2011

The Israeli Journal of Aquaculture - Bamidgeh, 63(1)

Abstract:

Investigations are underway in the Centre de Recherches Océanologiques d'Abidjan (Côte d'Ivoire) to find whether the catfish (*Heterobranchus bidorsalis*) could be an interesting aquaculture species. Within this framework a 28-day aquarium culture feeding trial was conducted to investigate the effects of three diets (*Artemia salina* nauplii, beef brain enriched with vitamins, and a compound food) on the growth and survival rates in 2-day post hatch *H. bidorsalis*. The feeding experiments started after the yolk sac of the larvae was absorbed (initial mean weight = 2.03 ± 0.38 mg). Larvae fed *Artemia* nauplii had a higher growth rate (final mean weight = 708.60 ± 411.61 mg) than those fed beef brain (381.81 ± 118.88 mg) or compound food (102.72 ± 48.09 mg). Conversely, the beef brain diet yielded a better survival rate ($70.47 \pm 9.48\%$) than the *Artemia* nauplii ($38.72 \pm 7.74\%$) or the compound diet ($5.37 \pm 2.24\%$). Thus, beef brain can be used as a starter food for larval rearing of *H. bidorsalis*.

(Centre de Recherches Océanologiques, BPV 18 Abidjan, Côte d'Ivoire ; email of Yao Laurent Alla : laurentalla@yahoo.fr)

EARLY WEANING OF DISCUS SYMPHYSODON SPP. LARVAE: HISTOLOGICAL AND MORPHOLOGICAL OBSERVATIONS

İhsan Çelik, Umur Önal, Şükran Cirik, Canan Duman, Tuncay İngin, Pınar Çelik-2011

The Israeli Journal of Aquaculture - Bamidgheh, 63(1)

Abstract:

To determine the optimal timing for weaning discus (*Symphysodon* spp.), larvae were fed a control diet of 100% *Artemia*, or weaned onto a micro-ground diet on day 18, 23, or 28 after hatching, until 45 days after hatching. During the first 14 days, the development of the digestive tract was studied to determine key events in the early ontogeny of discus larvae. There were significant ($p < 0.05$) differences among treatments in the growth of the larvae. The highest weight increase was observed in the control group but good growth was also obtained when the larvae were weaned to dry feed 28 days after hatching. The specific growth rate (SGR) was 6.0 ± 0.19 in the control group and 0.4 ± 0.239 , 2.0 ± 0.257 , and 5.2 ± 0.382 in the 18, 23, and 28 day groups, respectively. Mean survival in all treatments was 56.25% with no significant differences among treatments.

(Department of Aquaculture, Fisheries Faculty, Çanakkale Onsekiz Mart University, Terzioğlu Campus, 17100 Çanakkale, Turkey; email of İhsan Çelik: celik_ıhsan@yahoo.com)

REPLACEMENT OF FISHMEAL USING POULTRY OFFAL MEAL IN PRACTICAL FEEDS FOR FRY OF THE AFRICAN CATFISH (*CLARIAS GARIEPINUS*)

A.E. Falaye, A. Omoike, E.K. Ajani, O.T. Kolawole-2011

The Israeli Journal of Aquaculture - Bamidgheh, 63(1)

Abstract:

A 70-day feeding trial was conducted to test the effect of partial replacement of fishmeal by poultry offal in the diet for fry of the African catfish, *Clarias gariepinus*. Four isonitrogenous rations containing replacement of 0 (control), 30%, 60%, or 90% fishmeal by poultry offal were fed to three replicate groups of *C. gariepinus* fingerlings (0.74 g). Growth performance and nutrient utilization of the fish were evaluated based on weight gain, protein intake, protein efficiency ratio, specific growth rate, gross efficiency of food conversion, and carcass analysis. The average weight gains of fingerlings fed the control (2.43 g) and 30% replacement diet (2.31 g) were higher than in fish fed the 60% (2.09 g) and 90% (2.0 g) replacement diets. The feed conversion ratio (1.48-1.62) was lowest in fish fed the control diet and highest in fish fed the 90% replacement diet. The specific growth rate, protein efficiency ratio, and apparent net protein utilization significantly decreased ($p < 0.05$) as the level of dietary poultry offal increased. It was concluded that replacement of up to 30% fishmeal by chicken offal meal enhances growth performance of *C. gariepinus* fry.

(Department of Wildlife & Fisheries Management, University of Ibadan, Ibadan, Nigeria; email of A. Omoike: dromoke@yahoo.com)

SUSCEPTIBILITY OF JUVENILE SOLE *SOLEA SENEGALENSIS* TO MARINE ISOLATES OF VIRAL HAEMORRHAGIC SEPTICAEMIA VIRUS FROM WILD AND FARMED FISH

C. López-Vázquez, M. Conde, C. P. Dopazo, J. L. Barja, I. Bandín-2011

Abstract:

The susceptibility of sole *Solea senegalensis* to infection with 3 viral haemorrhagic septicaemia virus (VHSV) strains obtained from wild Greenland halibut *Reinhardtius hippoglossoides* and farmed turbot *Psetta maxima* was demonstrated. Fish were infected by an intraperitoneal (i.p.), immersion or cohabitational route, and maintained at 16°C. Infection trials showed that VHSV isolates were pathogenic for sole fingerlings by i.p. injection and waterborne exposure causing moderate levels of mortality (10 to 55%). In addition, the mortality observed in fish cohabitating with i.p.-infected sole confirms horizontal transmission of the virus. However, the low rates of mortality registered in this challenge suggest that there is a low dissemination of virus by the i.p.-infected sole, which results in lower secondary challenge of the cohabitating fish. External signs of disease included haemorrhaging of the ventral area and ascitic fluid in the body cavity. Dead fish were tested for VHSV by both cell culture and RT-PCR assay, using pools of kidney and spleen from 10 individuals. Virus was recovered from most of the pools composed of dead fish. The results obtained in this study not only demonstrate the susceptibility of sole to the VHSV strains employed but also indicate that wild VHSV marine isolates represent a potential risk for sole aquaculture.

(Unidad de Ictiopatología, Departamento de Microbiología, Instituto de Acuicultura, Universidad de Santiago de Compostela, 15782 Santiago de Compostela, Spain; email of I. Bandín: isabel.bandin@usc.es)

A STANDPIPE SCREEN DESIGN TO PREVENT FRY LOSS DURING TANK CLEANING

Richard D. Clayton, Robert C. Summerfelt-2011

North American Journal of Aquaculture, 73(2): 104 - 106

Abstract:

Intensive larviculture of walleye *Sander vitreus* and other fishes require fine screens over the standpipe to retain the small fish. The high feeding rate of small (<710-µm) microparticulate feed requires that screens be removed for daily cleaning with pressurized water to remove waste feed, oil, and biofilm. Standard screens have an open bottom that can trap fry in the space between the standpipe and the screen when the screen is replaced. Here we describe a modification of a standpipe screen that prevents the fry from entrapment in the space between screen and standpipe.

(Department of Natural Resource Ecology and Management, Iowa State University, Ames, Iowa, USA)

EFFICACY AND TOXICITY OF IODINE DISINFECTION OF ATLANTIC SALMON EGGS

Marc A. Chalupnicki, H. George Ketola, Clifford E. Starliper, Dennis Gallagher-2011

North American Journal of Aquaculture 73(2): 124 – 128

Abstract:

Recent interest in the restoration of Atlantic salmon *Salmo salar* in the Great Lakes has given rise to new culture techniques and management programs designed to reduce pathogen transmission while stabilizing and enhancing wild populations. We examined the toxicity of iodine to Atlantic salmon eggs and its effectiveness as a disinfectant against bacteria on egg surfaces. We spawned and fertilized eight gravid Atlantic salmon from Cayuga Lake, New York, and exposed their eggs to 10 concentrations of iodine (5, 10, 50, 75, 100, 500, 750, 1,000, 5,000, and 7,500 mg/L) for 30 min during water hardening. An additional subsample of unfertilized eggs was also exposed to some of the same concentrations of iodine (5, 10, 50, 75, and 100 mg/L) to determine the efficiency of disinfection. Viable eggs were only obtained from four females. Survival of eggs to the eyed stage and hatch tended to be reduced at iodine concentrations of 50 and 75 mg/L and was significantly reduced at concentrations of 100 mg/L iodine or more. We calculated the concentrations of iodine that killed 50% of the Atlantic salmon eggs at eye-up and hatch to be 175 and 85 mg/L, respectively. *Aeromonas veronii*, *A. schubertii*, *A. hydrophila*, *A. caviae*, *Plesiomonas shiggeloides*, and *Citrobacter* spp. were the predominant bacteria present on the surface of green eggs and were significantly reduced by an iodine immersion. The use of iodine as a disinfectant on Atlantic salmon eggs was effective at low concentrations (50-75 mg/L), for which toxicity to Atlantic salmon was minimal.

(U.S. Geological Survey, Great Lakes Science Center, Tunison Laboratory of Aquatic Science, Cortland, New York, USA)

PERFORMANCE OF LARVAL FLORIDA POMPANO FED NAUPLII OF THE CALANOID COPEPOD PSEUDODIAPTOMUS PELAGICUS

Eric J. Cassiano, Cortney L. Ohs, Charles R. Weirich, Nancy E. Breen, Andrew L. Rhyne-2011

North American Journal of Aquaculture 73(2): 114 – 123

Abstract:

The Florida pompano *Trachinotus carolinus* is a highly prized marine fish species, the larviculture of which currently includes the feeding of live rotifers and nauplii of brine shrimp *Artemia* spp. However, no previous studies have evaluated the feeding of copepod nauplii. In this study, the growth and survival of Florida pompano larvae fed nauplii of the calanoid copepod *Pseudodiaptomus pelagicus* were compared with those of larvae fed the standard reference diet of enriched rotifers *Brachionus plicatilis*. Experiments were conducted during the first 7-9 d posthatch (DPH), a period preceding the provision of *Artemia* nauplii. Treatments included feeding only copepod nauplii during the first day, the first three days, and on all days, as well as copepod nauplii mixed with rotifers during the entire experiment. In addition, the dietary effects on larval fatty acid composition were examined. Feeding copepod nauplii at a density of 2.0-3.5 nauplii/mL during the first day or the first three days of feeding had advantages over feeding only rotifers. However, after approximately 3 DPH, increased quantities of nauplii were needed to provide sufficient nutrients for growth. This was demonstrated in larvae fed copepod nauplii for the entire trial, for which survival was significantly higher than for the other treatments but for which growth was significantly reduced. Larvae fed a mixture of rotifers and nauplii for the entire trial had survival similar to that of larvae fed only rotifers (~40%); however, growth was greater in larvae fed the mixed diet, suggesting that there is a nutritional advantage to including copepods in the diet. Fatty acid analyses revealed that increased levels of docosahexaenoic acid were associated with larvae fed copepods, which probably contributed to the observed higher survival and growth. These results indicate that there are multiple benefits to feeding copepods to Florida pompano larvae.

(Program in Fisheries and Aquatic Sciences, School of Forest Resources and Conservation, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida, USA)

FIRST STUDIES OF EMBRYONIC AND LARVAL DEVELOPMENT OF COILIA NASUS (ENGRAULIDAE) UNDER CONTROLLED CONDITIONS

Gangchun Xu, Xue Tang, Chengxiang Zhang, Ruobo Gu, Jinliang Zheng, Pao Xu, Guowei Le-2011

Aquaculture Research 42(4): 593–601

Abstract:

Herein, we describe the embryonic and larval development stages of *Coilia nasus*, an anadromous fish that is indigenous to the Yangtze River and the northwest region of the Pacific Ocean. The success of artificial breeding programmes and modern methods of reproduction allowed us to accurately describe the development stages of *C. nasus*. These stages were recorded using a binocular microscope and a digital camera-equipped microscope, and histological and scanning electron microscopy observations were also conducted. Development can be divided into four periods: embryonic, prelarval, larval and juvenile. The fertilized eggs were spherical, transparent, non-adhesives and buoyant, with an average diameter of 0.80 ± 0.10 mm. Complete early embryonic development took place within 40–43 h post hatching, and the new hatchlings were 2.85 ± 0.20 mm long. The mouth openings (0.25–0.35 mm) appeared at day 6 post hatching. Complete metamorphosis took place by day 60, at which time the larvae transformed into juveniles (65 ± 5.8 mm) and attained skin coloration.

(Key Open Laboratory for Genetic Breeding of Aquatic Animals and Aquaculture Biology, Ministry of Agriculture, Freshwater Fisheries Research Center, Chinese Academy of Fishery Sciences, Wuxi 214081, Jiangsu Province, China; email of P. Xu: xup@jrc.cn)

EFFECT OF LIPID SUPPLEMENTATION ON REPRODUCTIVE PERFORMANCE OF FEMALE CHANNEL CATFISH, *ICTALURUS PUNCTATUS*, INDUCED AND STRIP-SPAWNED FOR HYBRIDIZATION

H.E. Quintero, E. Durland, D. Allen Davis, R. Dunham-2011

Aquaculture Nutrition 17(2) : 117–129

Abstract:

The influence of different lipid sources and n3:n6 ratios on reproductive performance of female channel catfish, *Ictalurus punctatus* was evaluated. A commercial catfish feed was top coated with 2% oil and offered to brood stock females fish during 70–85 days before spawning season. Four dietary treatments were formulated using the following top coating ratios: diet 1, soybean oil 9.5 g kg⁻¹ and linseed oil 10.5 g kg⁻¹; diet 2, soybean oil 17.5 g kg⁻¹ and linseed oil 2.5 g kg⁻¹; diet 3, 20.0 g kg⁻¹ linseed oil, and diet 4, 10.0 g kg⁻¹ menhaden fish oil, supplemented with 5.0 g kg⁻¹ arachidonic acid (ARA), and 5.0 g kg⁻¹ docosahexaenoic acid (DHA). Fatty acid composition of the eggs reflected the effect of dietary treatment offered during spring season. Supplementation of ARA, EPA and DHA in commercial catfish feed in the form of menhaden fish oil with purified liquid algae extracts of ARA and DHA produced from two to five times the number of fry per female body weight when compared to the effect of fed top coated with vegetable oils. Although, this effect was not statistically significant it may represent an economical improvement for the industry.

(Department of Fisheries and Allied Aquacultures, 203 Swingle Hall, Auburn University, Auburn, AL 36849-5419, USA; email of Herbert E. Quintero: fonsehq@auburn.edu)

EFFECT OF ARACHIDONIC ACID SUPPLEMENTATION ON REPRODUCTIVE PERFORMANCE OF TANK-DOMESTICATED *PENAEUS MONODON*

G.J. Coman, S.J. Arnold, M. Barclay, D.M. Smith-2011

Aquaculture Nutrition 17(2): 141–151

Abstract:

The reproductive performance of domesticated *Penaeus monodon* was assessed when fed on two experimental semi-moist maturation diets varying in their arachidonic acid content for 21 days before ablation and throughout a 17-day reproductive assessment. The biochemical composition of the two semi-moist two diets was similar with the exception of arachidonic acid (ARA) content; the basal diet (BAS) consisting of 0.9 g kg⁻¹ DM ARA (1.1% of total fatty acids) and the supplemented diet (ARA-SUP) consisting of 5.0 g kg⁻¹ DM ARA (5.8% of total fatty acids). ARA/EPA and ARA/DPA ratios were 0.1 in the BAS diet and 0.5 in the ARA-SUP diet. Fatty acid composition of the spawned eggs was comparable between diets with the exception of ARA concentration, which was higher in the ARA-SUP (8.95 ± 0.44 g kg⁻¹ DM) than the BAS (3.23 ± 0.17 g kg⁻¹ DM) (P < 0.0001). The cumulative percentage of females spawning (mean ± SE after 17 days) (31.9 ± 7.0%; 24.1 ± 1.3%), number of spawnings per female (0.48 ± 0.1; 0.29 ± 0.02), and eggs per female (62 520 ± 16 935; 44 521 ± 9914) was significantly (P < 0.0001) higher for the ARA-SUP than the BAS. Results of this study suggest that arachidonic acid plays a key role in promoting egg development and spawning in *P. monodon*.

(CSIRO Food Futures National Research Flagship, CSIRO Marine and Atmospheric Research, Cleveland, Qld 4163, Australia; email of G.J. Coman: greg.coman@csiro.au)

INGESTION OF ARTIFICIAL DIETS WITH DIFFERENT TEXTURES AS DETERMINED BY THE INERT MARKER YTTERBIUM OXIDE DURING CULTURE OF EARLY-STAGE PHYLLOSOMA OF THE SPINY LOBSTER, *JASUS EDWARDSII*

S.L. Cox, M.P. Bruce, A.J. Ritar-2011

Abstract:

Instar 1 and 2 *Jasus edwardsii* (Decapoda; Palinuridae) phyllosoma larvae were fed an artificial diet formulation (based on fish and mussel) consisting of three different gelatin combinations (firm, 4% inclusion; medium, 2% inclusion; and soft, no gelatin). The diet contained ytterbium oxide (Yb₂O₃; 1% inclusion), an inert heavy metal marker, which was used to confirm diet consumption in instar 1 and 2 phyllosoma. Over a 6-h feeding period, instar 1 phyllosoma showed a preference for the soft and medium diets as opposed to the firm diet, but this effect was not significant with instar 2. The artificial

diets remained palatable over the duration of the experiments, suggesting leaching did not influence diet attractiveness. It is suggested that diets comprising softer food items such as microencapsulated pellets or gelatinous formulated diets and pastes are most suitable for early-instar phyllosoma. Furthermore, it is also suggested that Yb₂O₃ is a potentially useful marker for ongoing quantitative work on diet utilization in lobster larvae.

(School of Biological Sciences, University of Auckland, Auckland Mail Center, Auckland, New Zealand; email of S.L. Cox: s.cox@niwa.co.nz)

THE EFFECTS OF DIETARY LONG-CHAIN ESSENTIAL FATTY ACIDS ON GROWTH AND STRESS TOLERANCE IN PIKEPERCH LARVAE (*SANDER LUCIOPERCA* L.)

I. Lund, S.J. Steenfeldt-2011

Aquaculture Nutrition 17(2) : 191–199

Abstract :

The nutritional requirements of pikeperch larvae have been sparsely examined. Dietary polyunsaturated fatty acids, arachidonic acid (ARA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) may affect growth and physiological stress response in marine fish larvae, but these mechanisms have not received as much attention in freshwater fish. Pikeperch larvae were reared on *Artemia* from day 3 until 21 days posthatch. *Artemia* were enriched with six formulated emulsions, with inclusion of either fish oil, pure olive oil (POO) or olive oil supplemented with various combinations of ARA, EPA and DHA. Larval tissue FA was significantly related to the content in the diets, but larval growth was similar for all treatments. When exposed to stress by confinement in small tanks with culture tank water or saline water (15 g L⁻¹), mortality in larvae treated with POO was significantly higher than in the remaining treatments while tissue cortisol contents in these fish seemed lower. The findings of a lower stress response in larvae fed POO may be related to the lower tissue content in these larvae of essential fatty acids especially DHA but also EPA and ARA.

(National Institute of Aquatic Resources, Section for Aquaculture, Technical University of Denmark, The North Sea Science Park, 9850 Hirtshals, Denmark; email of Ivar Lund: il@aqua.dtu.dk)

A NEW METHOD FOR RAPID DNA EXTRACTION FROM ARTEMIA (BRANCHIOPODA, CRUSTACEA)

R. Manaffar, R. Maleki, S. Zare, N. Agh, S. Soltanian, B. Sehatnia, P. Sorgeloos, P. Bossier, G. Van Stappen-2010

International Journal of Biological and Life Sciences 6(2): 1123-127

Abstract:

Artemia is one of the most conspicuous invertebrates associated with aquaculture. It can be considered as a model organism, offering numerous advantages for comprehensive and multidisciplinary studies using morphologic or molecular methods. Since DNA extraction is an important step of any molecular experiment, a new and a rapid method of DNA extraction from adult *Artemia* was described in this study. Besides, the efficiency of this technique was compared with two widely used alternative techniques, namely Chelex® 100 resin and SDS-chloroform methods. Data analysis revealed that the new method is the easiest and the most cost effective method among the other methods which allows a quick and efficient extraction of DNA from the adult animal.
