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COMPLETE AND PARTIAL REPLACEMENT OF ARTEMIA NAUPLII BY MOINA MICRURA DURING EARLY POSTLARVAL CULTURE OF WHITE SHRIMP (LITOPENAEUS SCHMITTI)

L. Martín, A. Arenal, J. Fajardo, E. Pimentel, L. Hidalgo, M. Pacheco, C. García, D. Santiesteban-2006

Aquaculture Nutrition 12(2): 89-96

Abstract:

Growth rate, soluble protein content, osmotic stress and digestive enzyme activity were studied in early *Litopenaeus schmitti* postlarvae under different feeding regimens, by partially or completely replacing *Artemia nauplii* with *Moina micrura*. Growth was significantly higher in the postlarvae fed with a mixture of *M. micrura*, *Artemia nauplii* and algae (0.030 mg dry weight (dw) larval day<sup>-1</sup>, 17.4 ± 2.1% day<sup>-1</sup>), together with the postlarvae fed on *Artemia nauplii* and algae (0.027 mg dw larval day<sup>-1</sup>, 18.3 ± 1.9% day<sup>-1</sup>). Complete replacement of *Artemia nauplii* by *M. micrura* produced the lowest growth rate (0.018 mg dw larval day<sup>-1</sup>, 14.3 ± 1.6% day<sup>-1</sup>) and induced the highest protease and  $\alpha$ -amylase activities and lower soluble protein contents. No significant difference among the treatments could be detected in postlarval resistance to osmotic stress. Based on the growth results, soluble protein content, enzymatic activity and osmotic stress resistance, we determined that the partial replacement of *Artemia nauplii* by *M. micrura* did not affect the growth, the soluble protein content and the nutritional state in the postlarvae of *L. schmitti*. To our knowledge, this is the first reported use of *M. micrura* as feed for early postlarvae of *L. schmitti*.

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IODINE ENRICHMENT OF ARTEMIA AND ENHANCED LEVELS OF IODINE IN ATLANTIC HALIBUT LARVAE (HIPPOGLOSSUS HIPPOGLOSSUS L.) FED THE ENRICHED ARTEMIA

M. Moren, I. Opstad, T. Van Der Meeren, K. Hamre-2006

Aquaculture Nutrition 12(2): 97-102

Abstract :

Flatfish metamorphosis is initiated by the actions of thyroid hormones (TH) and iodine is an essential part of these hormones. Hence, an iodine deficiency may lead to insufficient levels of TH and incomplete metamorphosis. In this study, different iodine sources for enrichment of *Artemia* were evaluated and the levels of iodine obtained in *Artemia* were within the range of 60–350 µg g<sup>-1</sup> found in copepods. Larval Atlantic halibut was fed *Artemia* enriched with either normal DC-DHA Selco or DC-DHA Selco (commercial enrichments) supplemented with iodine from days 9 to 60 postfirst feeding. There was no significant difference in growth, mortality or metamorphic development between the groups. The analyses showed that we were able to enrich *Artemia* with iodine. Further, the larvae-fed iodine-enriched *Artemia* had higher whole body iodine concentration compared to larvae-fed *Artemia* without iodine enrichment.

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INFLUENCE OF LARVAL CO-FEEDING WITH LIVE AND INERT DIETS ON WEANING THE TONGUE SOLE CYNOGLOSSUS SEMILAEVIS

Q. Chang, M.Q. Liang, J.L. Wang, S.Q. Chen, X.M. Zhang, X.D. Liu-2006

Aquaculture Nutrition 12(2): 135-139

Abstract :

The tongue sole *Cynoglossus semilaevis*, an inshore fish in China, has showed great potential in aquaculture recently. However, poor survival was recorded during the period of weaning from live *Artemia* to artificial diets. In this paper, the influence of co-feeding larvae with live and inert diet on weaning performance was described. The *C. semilaevis* larvae were reared at  $21 \pm 1$  °C and fed four different feeding regimes from 6 days post-hatching (dph): A, *Artemia* (10 individuals mL<sup>-1</sup>); B, *Artemia* (5 individuals mL<sup>-1</sup>); C, mixed diet (10 *Artemia* individuals mL<sup>-1</sup> and 12 mg L<sup>-1</sup> inert diet); and D, mixed diet (5 *Artemia* individuals mL<sup>-1</sup> and 12 mg L<sup>-1</sup> inert diet). Rotifers were also supplied in all cases during the first days of feeding. Mixed diets of commercial formulated feed and live prey (rotifers and *Artemia*) allowed larvae to complete metamorphosis, achieving similar specific growth rate (SGR) ( $18.5 \pm 1.4\%$  and  $18.7 \pm 1.6\%$ ) and survival ( $40 \pm 7.6\%$  and  $48.5 \pm 6.8\%$ ) compared with larvae fed on live feed alone (SGR of  $18.3 \pm 1.2\%$ ,  $19.3 \pm 1.9\%$  and survival of  $41.2 \pm 11.3\%$ ,  $38 \pm 4.9\%$ ). However, in metamorphosed fish, when live feed was withdrawn on 31 dph, there was significant difference ( $P < 0.05$ ) in survival and growth among treatments. Metamorphosed fish, previously fed mixture diets during larval stages, had similar survival ( $62.1 \pm 7.6\%$  and  $62.8 \pm 3.9\%$  for regimes C and D, respectively) but higher than that obtained for fish that previously fed on live feed ( $49.3 \pm 2\%$  and  $42.1 \pm 3.9\%$  for regimes A and B, respectively) after weaning (day 60). The SGR of weaned fish previously fed live feed was similar ( $3.1 \pm 0.6\%$  and  $2.92 \pm 0.6\%$  for regimes A and B, respectively) but lower than that recorded for fish that was fed from day 6 to day 30 on the mixed diet ( $4.5 \pm 1.1\%$  and  $4.9 \pm 0.3\%$  for regimes C and D, respectively). It is suggested that weaning of *C. semilaevis* from early development would appear to be feasible and larval co-feeding improves growth and survival.

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#### DIETARY ASCORBIC ACID REQUIREMENT OF JUVENILE AYU (PLECOGLOSSUS ALTIVELIS)

Z. Xie, C. Niu-2006

Aquaculture Nutrition 12(2) : 151-156

Abstract :

To investigate dietary ascorbic acid (AA) requirement of juvenile ayu (*Plecoglossus altivelis*) weighing  $1.27 \pm 0.02$  g, eight diets were formulated with graded levels (0, 20, 40, 80, 160, 320, 640 and 1280 mg AA kg<sup>-1</sup>) of AA supplied as ascorbyl polyphosphate. Each experimental diet was fed to four-replicate groups to apparent satiation three times a day for 8 weeks. At the end of the feeding trial, fish fed AA-deficient diet showed visible AA deficiency signs and low survival. Based on the four-parameter saturation kinetics model, the calculated AA requirement levels for each dose-dependent response [weight gain, hepatic AA concentration, hydroxyproline (HyPro) concentration in skin and HyPro concentration in backbone] were 116, 226, 47 and 35 mg kg<sup>-1</sup>, respectively. Based on the maximal growth performance, a level of 116 mg AA kg<sup>-1</sup> was recommended for commercial diet of juvenile ayu. To maintain tissue HyPro saturation and avoid AA deficiency symptoms, the minimum required dietary AA level was 47 mg kg<sup>-1</sup>. Hepatic AA saturation was considered as the most stringent criterion for determination of AA requirement.

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#### SECONDARY STRESS RESPONSES IN INDIAN MAJOR CARPS LABEO ROHITA (HAMILTON), CATLA CATLA (HAMILTON) AND CIRRHINUS MRIGALA (HAMILTON) FRY TO INCREASING PACKING DENSITIES

Nirupama Chatterjee, Asim K. Pal, Tilak Das, Manush S. Mohammed, Kamal Sarma, Gudipati Venkateshwarlu, Subhas C. Mukherjee-2006

Aquaculture Research 37(5): 472-476

Abstract :

Glycogen content and metabolic enzyme activities viz. lactate dehydrogenase (LDH), malate dehydrogenase (MDH), aspartate amino transferase (AST) and alanine amino transferase (ALT) in Indian major carps, *Labeo rohita*, *Catla catla* and *Cirrhinus mrigala*, were investigated after a 6 h transportation trial to compare the species-specific variation and the effect of increased packing density on the metabolism. Fish ( $45\pm 5$  mm,  $0.5\pm 0.1$  g) were packed in three densities (100, 150 and 200 L1) for the experiment, and 12 specimens of each species were randomly sampled from all the treatments at the end of transportation. The glycogen content of *L. rohita* fingerlings decreased significantly ( $P<0.05$ ) with increasing packing density. The activities of enzymes LDH, MDH, AST and ALT showed a rising trend with increasing packing density in all the three species. Species-specific differences were observed in various tested parameters at the lowest packing density (100 fry L1). Alanine amino transferase and LDH activities were significantly ( $P<0.05$ ) lower in *C. mrigala* as compared with the other two species. However, glycogen reserves and MDH activity were not significantly different ( $P>0.05$ ) among the species. The present study reveals that the optimum packing density for Indian major carp fry (100 fry L1) for transportation up to 6 h and metabolic regimes are species specific during transportation.

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LITOPENAEUS VANNAMEI (BOONE) POST-LARVAL SURVIVAL RELATED TO AGE, TEMPERATURE, PH AND AMMONIUM CONCENTRATION

Francisco J. Magallón Barajas, Rosalía Servín Villegas, Guillermo Portillo Clark, Berenice López Moreno-2006

Aquaculture Research 37(5): 492-499

Abstract:

Transport of post-larvae shrimp used in aquaculture is an important element of successful cultivation because of the potential for stress during stocking procedures. To find optimum transport conditions, several bioassays were performed in the laboratory to evaluate survival of whiteleg shrimp *Litopenaeus vannamei* 5–30-day-old postlarvae under conditions similar to those encountered during transport from the hatchery to nursery and shrimp ponds. Postlarvae were exposed for 4 h to different temperatures and pH levels ammonia concentrations. Survival was significantly reduced after a 4 h exposure to pH 9 and was inversely related to temperature with or without 7 mg L1 of ammonia. The 15- and 20-day-old postlarvae had higher survival rates than other ages. The lowest survival occurred in alkali conditions (pH 9), with 7 mg L1 ammonia at 30 and 32°C. To assure optimal survival of postlarvae during transfer from the hatchery to the nursery and shrimp ponds, we recommend temperatures below 28°C, pH no higher than 8, no ammonia and post-larval age at least 15 days.

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EXPERIMENTAL EVALUATION OF CO-CULTURE OF JUVENILE SEA CUCUMBERS, HOLOTHURIA SCABRA (JAEGER), WITH JUVENILE BLUE SHRIMP, LITOPENAEUS STYLIROSTRIS (STIMPSON)

Steven W. Purcell, Jacques Patrois, Nicolas Fraisse-2006

Aquaculture Research 37(5): 515-522

Abstract:

The co-culture of juvenile sea cucumber *Holothuria scabra* (Jaeger), or 'sandfish', with juvenile blue shrimp *Litopenaeus stylirostris* (Stimpson) was tested by growing groups in co-culture and monoculture for 3 weeks in tanks with enriched sand substratum. Feed was supplied on trays, accessible only to shrimp. Survival of shrimp and sandfish was high in all treatments (73–100%). Growth of shrimp did not differ between monoculture and co-culture, but sandfish grew significantly slower in co-culture ( $P=0.03$ ), although their sand burying and surface foraging were apparently

unaffected by shrimp ( $P=0.76$ ). However, shrimp increased the levels of total ammonia-N in tanks, which related inversely with sandfish growth ( $P=0.04$ ). Conversely, sandfish did not appear to lower the water quality for shrimp culture. While sandfish bioturbate sediments and eat organic deposits, the juveniles did not significantly reduce the organic content of sand in tanks. Co-culturing juveniles of the two species in earthen ponds appears feasible, with no detriment to shrimp production, presenting a cost-effective method for growing sandfish to larger sizes for restocking. These findings underpin further studies to test the viability of commercial co-culture of sandfish with blue shrimp at later stages in the production cycle of shrimp.

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#### SPERMATOPHORE CRYOPRESERVATION AND ARTIFICIAL INSEMINATION OF BLACK TIGER SHRIMP, *PENAEUS MONODON* (FABRICIUS)

Amrit N. Bart, Sudarhma Choosuk, Dhirendra P. Thakur-2006

Aquaculture Research 37(5): 523-528

Abstract :

To develop an appropriate cryopreservation protocol for spermatophores of black tiger shrimp, *Penaeus monodon*, three cryoprotectants (dimethyl sulphoxide (DMSO), methanol (MeOH) and ethylene glycol (EG)) at two concentrations (5% and 10%) were examined. Artificial implantation of spermatophores was also carried out to assess the fertilizing ability of fresh and post-thaw spermatophores. Spermatophores were collected during consecutive regenerations (15-day intervals) and assessed for qualitative and quantitative changes and also for fertilizing ability by implantation. The mean fertilization rate for artificial insemination using post-thaw spermatophore was  $79.9\pm 3.7\%$ , lower than the fertilization rates observed for artificial implantation using fresh spermatophore and natural mating. Mean hatch rates for fresh spermatophore, frozen-thawed spermatophore and natural mating were  $88.8\pm 0.6\%$ ,  $87.8\pm 0.4\%$  and  $88.3\pm 0.5\%$ , respectively; and there was no difference among the three groups. The mean fertilization rate of spermatophores collected during the first stripping was higher ( $90.6\pm 0.6$ ) than during the second stripping ( $85.7\pm 2.6$ ), but the mean hatch rate was not different between the two strippings. The highest mean sperm viability ( $79.7\pm 0.4\%$ ) was obtained from DMSO (5%), with no survival observed in the 10% MeOH treatment. Spermatophore weight, total sperm count and percentage of abnormal sperm were not different between spermatophores collected at the first and second stripping. This is the first study to report high fertilization and hatch rates from cryopreserved spermatophore using artificial implantation of spermatophore before spawning.

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#### SEX ORGAN EXTRACTS AND ARTIFICIAL HORMONAL COMPOUNDS AS SEX PHEROMONES TO ATTRACT BROODFISH AND TO INDUCE SPAWNING OF CHINESE BLACK SLEEPER (*BOSTRICHTHYS SINENSIS* LACÉPÈDE)

Wan-Shu Hong, Shi-Xi Chen, Qi-Yong Zhang, Wei-Yun Zheng-2006

Aquaculture Research 37(5): 529-

Abstract :

Ovarian, testicular and seminal vesicle extracts of mature Chinese black sleeper (*Bostrichthys sinensis* Lacepede), synthetic steroids  $17\alpha$ -progesterone ( $17\alpha$ -P),  $17\alpha,20\beta$ -dihydroxy-4-pregnen-3one ( $17\alpha,20\beta$ -P) and prostaglandins PGE2 and PGF2 were used in an attempt to attract broodfish and to induce spawning. Furthermore,  $17\alpha$ -P, PGE2 and PGF2 levels were determined in extracts, and PGE2 and PGF2 levels were determined in holding and spawning waters. The results showed that ovarian extracts attracted more males than females to enter artificial nests, while testicular and seminal vesicle extracts attracted more females than males. The highest percentage of spawned nests were found when  $17\alpha,20\beta$ -P and PGE2 were administered to the nests, while the largest egg numbers and the

mean highest fertilization rate were observed when PGE2 was added. In ovarian extract, 17 $\alpha$ -P level was higher than levels in testicular or seminal vesicle extracts. The PGE2 levels were significantly ( $P < 0.05$ ) higher than PGF2 in the ovarian, testicular and seminal vesicle extracts. The PGE2 and PGF2 levels in spawning waters were higher than those in holding waters. The PGE2 levels were greatly significantly ( $P < 0.01$ ) higher than PGF2 in spawning and in holding waters. The results suggest that the sex organs of *B. sinensis* contain 17 $\alpha$ -P, 17 $\alpha$ , 20 $\beta$ -P, PGE2 and PGF2 and that 17 $\alpha$ -P, 17 $\alpha$ , 20 $\beta$ -P and PGE2 may act as sex pheromones in this species, attracting both male and female conspecifics to spawning sites and inducing spawning. Among the compounds tested, PGE2 was the most effective sex pheromone for induction of spawning in *B. sinensis*.

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#### AN INDIVIDUAL-BASED POPULATION MODEL FOR ROTIFER (*BRACHIONUS PLICATILIS*) CULTURES

Morten Omholt Alver, Jo Arve Alfredsen, Yngvar Olsen-2006

*Hydrobiologia* 560(1): 93-108

Abstract:

An individual-based dynamic energy budget model is used in a Lagrangian simulation to compute population dynamics for the rotifer strain *Brachionus plicatilis*. This model structure allows description of transient as well as stationary conditions, making the model useful for a variety of applications. It also has the advantage of allowing the use of dynamic energy budget (DEB) theory in describing rotifer energetics. The model is developed with aquaculture-related applications in mind, including planning, monitoring and control of rotifer production systems and first feeding of marine fish larvae. Simulations show acceptable agreement with measured data on the population level, with regard to steady-state egg ratio, yields of daily diluted cultures, and maximum net growth rate. Further refinement of the model can enable its application for processes such as essential nutrient enrichment of rotifers for first feeding of larval fish.

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#### EARLY DEVELOPMENTAL STAGES OF THE GREEN TIGER PRAWN, *PENAEUS SEMISULCATUS* DE HAAN (CRUSTACEA, DECAPODA, PENAEIDAE)

Jesse D. Ronquillo, Toshio Saisho, Robert Scott McKinley-2006

*Hydrobiologia* 560(1): 175-196

Abstract:

Gravid females of *Penaeus semisulcatus* were spawned in the laboratory by natural means. The embryos were documented and the larvae were reared from hatching to postlarval stage at 28.2–30.0 °C and 33.5–34.5 g kg<sup>-1</sup> salinity for about 10 days (223 h 55 min). Six naupliar stages, three protozoa stages, three mysis stages and the first postlarval stage were described and illustrated. The larvae were fed only with microalgae *Tetraselmis tetrahele* and *Chaetoceros gracilis* from first protozoa until the second mysis, with about 90% survival rate; from the third mysis until the first postlarva they were fed with similar microalgae coupled with rotifer *Brachionus plicatilis* and *Artemia nauplii*. The embryonic and larval stages of *P. semisulcatus* are generally similar to those of other closely related species in the family Penaeidae, such as *Melicertus canaliculatus*, *Fenneropenaeus merguensis*, and *Marsupenaeus japonicus*, except for the size and structure of diagnostic characters, setation of appendages and duration of metamorphoses. The change in the feeding habit during ontogeny was related to morphological transformation of the feeding apparatus of larvae and postlarvae. This paper is the first comprehensive and complete account of the early developmental stages of *P. semisulcatus*.



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SHORT RESEARCH NOTE: ECOLOGICAL AND BIOLOGICAL NOTES ON THE BRINE SHRIMP *ARTEMIA* (CRUSTACEA: BRANCHIOPODA: ANOSTRACA) FROM CARMEN ISLAND, BAJA CALIFORNIA SUR, MÉXICO

Gabino A. Rodríguez-Almaraz, Carlos Zavala, Roberto Mendoza, Alejandro M. Maeda-Martínez-2006

Hydrobiologia 560(1): 417 – 423

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RELATIONSHIPS BETWEEN RELEASE SEASON AND FEEDING PERFORMANCE OF HATCHERY-REARED JAPANESE FLOUNDER *PARALICHTHYS OLIVACEUS*: IN SITU RELEASE EXPERIMENT IN COASTAL AREA OF WAKASA BAY, SEA OF JAPAN

Yosuke Tanaka, Hiroshi Yamaguchi, Osamu Tominaga, Tatsuo Tsusaki, Masaru Tanaka-2006

Journal of Experimental Marine Biology and Ecology 330(2): 511-520

Abstract:

Two groups of hatchery-reared juveniles of Japanese flounder *Paralichthys olivaceus* (Temminck and Shlegel) were experimentally released in Wada Beach, Fukui Prefecture, Japan and their feeding state examined in comparison to wild juveniles to investigate the optimal release season and the relationship between food availability and feeding performance of juveniles. We released two groups of 40,000 juveniles of ca. 50 mm size, one group in the early (29 May) and the other in late (2 July) seasons, periods with predicted high and low densities of prey mysids, respectively, although the abundance of mysids fluctuated markedly during the season. Food availability was higher for the early release group than the late release group. Although the main stomach contents of released and wild juveniles were mainly mysids and fish, the feeding state differed between the early and late release groups. The early release group had a stomach content index (SI) similar to that of the wild juveniles, but the SI of the late group was significantly less than that of the early release group and wild juveniles. The percentage of fish with empty stomachs was much higher in the late release group than in the other two groups. In addition, the density decrease rate was significantly more rapid for the late release group than the early release group. Clear correspondence between the food availability and feeding state of the released flounder juveniles indicates that the release of juveniles in an appropriate season when mysids are abundant is crucial for successful stocking.

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FOOD INTAKE AND ABSORPTION ARE AFFECTED BY DIETARY LIPID LEVEL AND LIPID SOURCE IN SEABREAM (*SPARUS AURATA* L.) LARVAE

Sofia Morais, Michal Torten, Oryia Nixon, Sigal Lutzky, Luís E.C. Conceição, Maria Teresa Dinis, Amos Tandler, William Koven-2006

Journal of Experimental Marine Biology and Ecology 331(1): 51-63

Abstract:

Marine larval nutrition studies have classically focused on essential fatty acid (EFA) requirements and very little is known regarding the effect of total lipid level or lipid source on food ingestion and absorption, which are important factors determining growth. In the present work two experiments analysed food intake and nutrient absorption in seabream larvae in response to two dietary lipid levels (17–18% and 25–28%). The first experiment tested *Artemia* enriched on two levels of a fish oil emulsion (higher and lower—HF and LF, respectively), while in the second experiment larvae were co-fed *Artemia* enriched on one of two levels of a soybean oil emulsion and a microdiet (MD)

containing one of two levels of soybean oil as the main lipid source (higher and lower—HS and LS, respectively). Food intake and nutrient absorption were determined by performing radioactive trials using *Artemia* radiolabelled with [1-14C] oleic acid in the first experiment (at 26 and 33 days after hatching—DAH) and MD labelled with [1-14C] oleic acid or glycerol tri[1-14C] oleate (31 and 32 DAH) in the second experiment. The dietary treatments did not induce significant differences in larval dry weight in the first experiment, while food intake was significantly higher and nutrient absorption significantly lower in larvae fed the HF diet, compared to the LF treatment. In the second experiment, a significantly higher dry weight was achieved by larvae fed on the LS diet, which was also significantly more ingested and absorbed. The fish oil experiment supports the hypothesis that a higher food intake may cause a decrease in nutrient absorption efficiency, possibly through a faster gut transit, but in the soybean oil experiment total absorption appears to have simply reflected food intake. The results show that dietary lipid level significantly affects larval food intake and absorption efficiency but the effect was dependent on lipid source, suggesting that dietary fatty acid (FA) composition might be a more determinant factor than total lipid level. Food intake was apparently not regulated to meet a requirement for EFA. Lipid source or FA composition may regulate food intake through pre- or post-absorptive mechanisms, such as through effects on palatability, digestibility and stimulation of neuroendocrine pathways.

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#### IMMUNOSTIMULATION OF LARVAE AND JUVENILES OF COD, *GADUS MORHUA* L.

B. Magnadottir, B. K. Gudmundsdottir, S. Lange, A. Steinarsson, M. Oddgeirsson, T. Bowden, I. Bricknell, R. A. Dalmo, S. Gudmundsdottir-2006

Journal of Fish Diseases 29(3): 147-155

Abstract :

Cod larval culture is currently hampered by high mortalities in the first 2–3 weeks after hatching, often due to infectious diseases. The immune system of cod is not fully competent until 2–3 months after hatching. Conventional vaccination is, therefore, not of value before this time, and the larvae are wholly reliant on non-specific parameters for their defence against infection. A range of substances, generally derived from bacterial, fungal or plant origin, can activate these non-specific parameters. During three hatching seasons, 2001–2003, at the Marine Institute's Experimental Station, Stadur, Grindavik, Iceland, the effects of several immunostimulants on survival and disease resistance of cod larvae and juveniles were examined. Both bathing treatments and administration in the feed were used. One of these substances, lipopolysaccharide (LPS), isolated from the bacterium *Aeromonas salmonicida* (ssp. *salmonicida* or *achromogenes*), appeared in some instances to improve survival and have a beneficial effect on disease resistance. Other substances tested had limited effects. The results emphasize the need for further work in this field.

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#### SHORT COMMUNICATION: ISOLATION OF A PATHOGENIC STRAIN OF *VIBRIO ALGINOLYTICUS* FROM NECROTIC LARVAE OF *MACROBRACHIUM ROSENBERGII* (DE MAN)

N. S. Jayaprakash, S. S. Pai, R. Philip, I. S. B. Singh-2006

Journal of Fish Diseases 29 (3): 187-191

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#### CRYOPRESERVATION OF AYU SPERMATOZOA

Madoka Tsutaka, Shinichi Yamamoto, Kazuhiro Naka, Toshikazu Shimizu, Motoji Nakamura, Kenji Takii, Hiromi Ohta-2006

Nippon Suisan Gakkaishi 72 (1) 34-40

##### Abstract:

Semen of ayu *Plecoglossus altivelis altivelis* cryopreserved with a diluent comprising 10% MeOH (cryoprotectant) and 90% fetal bovine serum (FBS: extender) showed a higher rate of motility than that cryopreserved with other cryoprotectants (DMSO, glycerol, N,N-dimethylacetamide, N,N-dimethylformamide, ethanol) and extenders (ayu serum, artificial seminal plasma, 300 mM or 600 mM glucose). Compared with other rates of cooling, that of 42.5°C/min provided the highest rate of post-thaw motility. The post-thaw motility of samples cooled at 42.5°C/min to -50°C (just before immersion in liquid nitrogen) was higher than those cooled to -20°C, -30°C, -40°C, -60°C, or -70°C. A significant decrease was observed in the motility of post-thaw sperm kept in the diluent (10% MeOH and 90% FBS) for periods between 15 sec and 30 min. These results indicate that 10% MeOH and 90% FBS is the appropriate diluent for cryopreservation of ayu spermatozoa, that samples should be cooled at 42.5°C/min to -50°C and that the spermatozoa should be used for artificial fertilization immediately after thawing.

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#### ONTOGENETIC CHANGES IN TOLERANCE FOR ENVIRONMENTAL STRESS IN JAPANESE FLOUNDER *PARALICHTHYS OLIVACEUS* DURING EARLY DEVELOPMENT

Yukinori Shimada, Takahito Shikano, Tadahisa Seikai-2006

Nippon Suisan Gakkaishi 72 (2):169-173

##### Abstract:

Ontogenetic changes in physiological tolerance during larval development of Japanese flounder *Paralichthys olivaceus* were examined relative to a variety of environmental stresses as follows: freshwater, high salinity (salinity range: 30-55), high water temperature (temperature range: 20-36°C) and formalin (concentration range: 0-0.6%). Highest stress tolerance was shown by newly hatched larvae (1 day after hatching), and then decreased drastically until 10 days after hatching. We considered that the high sensitivity to external environmental stresses at 10 days after hatching was caused by the development of the mouth and opercula. Patterns of tolerance change during the early life stages differed depending on the environmental stresses.

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#### ADVANCED SPAWNING OF YELLOWTAIL *SERIOLA QUINQUERADIATA* AS EARLY AS DECEMBER BY MANIPULATIONS OF BOTH PHOTOPERIOD AND WATER TEMPERATURE

Kazuhiisa Hamada, Keiichi Mushiake-2006

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##### Abstract:

The present study examined the combined effects of photoperiod and temperature control on the ovarian maturation and human chorionic gonadotropin (HCG)-induced spawning of yellowtail *Seriola quinqueradiata*, with the aim of achieving advanced spawning as early as December. In experiments conducted from 2002 to 2004, the daylength was set to 8 hours (8L16D) for 10 days followed by a 10-hour daylength extension to 18 hours (18L6D) for the next 80 days under controlled water temperature that was maintained at 19°C before the injection of HCG. Female broodstock kept under these controlled conditions were induced to mature more rapidly than those kept under natural conditions. Neither controlled photoperiod nor controlled water temperature was sufficient to induce the maturation of fish. During these 3 years, fish kept under both controlled conditions were able to spawn in advance during December, with the total eggs produced per female ranging from 87×10<sup>3</sup> to 1000×10<sup>3</sup>. Survival rates for the first 10 days of the rearing experiments of larvae at first spawning



obtained in 2002 and 2004 were 14.1 and 36.7%, respectively. These values were similar to those obtained during the spawning season in April. This experiment showed that manipulations of both photoperiod and water temperature are effective in accelerating the maturation of female yellowtail broodstock and that good quality eggs may be obtained as early as December after HCG injection. (Goto Station, National Center for Stock Enhancement, Fisheries Reserch Agency, Goto, Nagasaki 853-0508, Japan)

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SHORT-PERIOD REFRIGERATION OF DISINFECTED PARTHENOGENETIC EGGS OF THE ROTIFER BRACHIONUS PLICATILIS

Masahiko Koiso, Nobuhiro Tezuka, Hiroshi Kuwada, Ken-Ichi Watanabe-2006

Nippon Suisan Gakkaishi 72(2): 239-240 (

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