

VANNAMEI CULTURE AT HIGHER TEMPERATURES

From: Nelson Gerundo nelsongerundo@yahoo.com

To: shrimp@yahoogroups.com

Date: October 8, 2008

Question

Has anyone ever done vannamei larviculture at higher temperature (starting from 32°C at zoea stage pushing up to 33°C at mysis stage)? We are accustomed at larviculture temperature between 30.5°C and 31.5°C until we got a suggestion to work at higher temperature. Can anyone give us some insights from their experience?

Comments 1

Dont be afraid to experience yourself the benefits of culturing P.vannamei larvae from Z1 through PL1 at 33–34°C

Jaime Baquerizo

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Comments 2

At SCT we used to acclimate N4-5 at 30°C then until they reached the Z3-M1 stage we increased gradually the temperature until we get 34.5°C. The metabolism increased so you can even save some time in the hatchery production.

Jose Manzo

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Comments 3

Thank you for sharing your method of temperature control and manipulation in the larval culture of P. vannamei by gradual increase to 34.5°C at Zoea 3 to Mysis 1 from N4-5. We had been using fixed temperature method at 31°C (fluctuating between 30.5°C and 31.5°C). Jaime Baquerizo had also stressed that there are more benefits working at higher temperature.

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DESCRIPTION OF LARVAL STAGES OF VANNAMEI LARVAE

From: Lorenzo Juarez lorenzojuarez@yahoo.com

To: shrimp@yahoogroups.com

Date: September 29, 2008

Question

Can someone help me find the original reference describing the larval stages of P. vannamei?

Comments 1

I think the only published papers regarding larval development of *P. vannamei* is written in Japanese. If you have Japanese colleagues, they can easily find it for you.

This is the paper: Kitani, H. 1986. Larval development of the white shrimp *Penaeus vannamei* Boone reared in the laboratory and the statistical observation of its naupliar stages. Bulletin of the Japanese Society of Scientific Fisheries 52(7): 1131-1139.

Agung asetiarto@yahoo.com

Comments 2

You can contact Hiroshi Kitani at hiroshi@jica.go.jp or hkmat@sta.att.ne.jp

His postal address is: Hiroshi Kitani, IFIC/JICA, Tokyo, Shinku-ku, Ichigaya, Honmura-Cho, 10-5, Japan 162-8433.

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Comments 3

For those who want to download the paper, herein is the electronic address:

<http://rms1.agsearch.agropedia.affrc.go.jp/contents/JASI/pdf/society/33-1955.pdf>

Robinson Bazurto buhocol@hotmail.com

Comments 4

Fellow listers may be interested to know that the full paper is available free of charge and in English from the Japanese Society of Fisheries Science at : <http://www.stage.jstage.jst.go.jp/browse/suisan>

The very same journal 52(7) has the description of the larval stages of *stylirostris*.

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NUTRITIONAL EVALUATION OF LIVE FOOD ORGANISMS AND COMMERCIAL DRY FEEDS USED FOR SEED PRODUCTION OF AMBERJACK *SERIOLA DUMERILI*

Takeshi Yamamoto, Kazuhisa Teruya, Takashi Hara, Hiroto Hokazono, Hiroshi Hashimoto, Nobuhiro Suzuki, Yasuro Iwashita, Hiroyuki Matsunari, Hirofumi Furuita, Keiichi Mushiake-2008

Fisheries Science 74 (5): 1096 – 1108

Abstract:

To improve the nutritional quality of live foods and dry feeds ordinarily used for the seed production of amberjack *Seriola dumerili*, the nutrient contents of rotifers, *Artemia nauplii* and commercial feeds used in two larval production stations were evaluated. For comparison of the nutrient contents, artificially produced larvae, wild-caught juveniles and wild zooplankton samples were also analyzed. The proportions of 22:6n-3 in the polar lipid of the cultured larvae increased by feeding the dry feeds. The taurine contents of the cultured larvae reflected the contents of their foods (rotifers < dry feed < *Artemia nauplii*). The taurine content and the proportion of 22:6n-3 in *Acartia* spp. were higher than in foods fed to the larvae. These parameters in the wild juveniles were higher than the cultured ones. The A/E ratios [(each essential amino acid/total essential amino acids) × 1000] of the total amino acids of the live foods and dry feeds were similar to those of the cultured larvae, except for the lower ratios of histidine, arginine, threonine and lysine in the live foods. The mucosal folds of the intestine of the cultured larvae did not show typical signs of dietary phospholipid deficiency. These results suggest that requirements of nutrients such as 22:6n-3 and taurine should be determined for mass production of amberjack seeds.

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REARING TENCH (*TINCA TINCA* L.) LARVAE ON LIVE FEED (*ARTEMIA*) AND ON TWO TRANSITION SCHEDULES FROM LIVE TO DRY DIETS

J. D. Celada, A. Aguilera, J. M. Carral, M. Sáez-Royuela, P. M. Melendre-2008

Journal of Applied Ichthyology 24(5): 595 – 600

Abstract:

Two 60-day experiments were carried out on tench (*Tinca tinca* L.) from day 5 post-hatch. Density was 20 larvae L⁻¹ and temperature 24 ± 0.5°C. In experiment 1, *Artemia* nauplii were the sole food, testing nauplii amounts and feeding frequency. High survival rates (between 79.5% and 95.5%) were obtained. Growth was faster as nauplii amounts were greater; the highest growth rate (11.00), weight (265.5 mg) and Fulton's coefficient (1.40) were obtained when fish were fed in excess once a day, without significant differences from the growth obtained by feeding in excess of eight times a day. In experiment 2, a dry diet for marine fish was tested as a replacement for *Artemia* nauplii, following two transition protocols, one faster than the other; high survival rates (between 77.7% and 87.1%) were again obtained. The slower transition allowed a growth rate of 10.14, length of 23.1 mm, weight of 158.3 mg and a Fulton's coefficient of 1.28, without significant differences from the faster transition. At all stages, growth values were significantly higher from feeding nauplii in excess as the sole food, but the required nauplii quantity was six times higher than the amount supplied to the animals fed the dry diet.

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EFFECT OF ESSENTIAL DIETARY FATTY ACIDS ON EGG PRODUCTION AND HATCHING SUCCESS OF THE MARINE COPEPOD *TEMORA LONGICORNIS*

Jan Ove Evjemo, Nils Tokle, Olav Vadstein, Yngvar Olsen-2008

Journal of Experimental Marine Biology and Ecology 365(1): 31-37

Abstract:

The calanoid copepod *Temora longicornis* and its food (seston of size < 200 µm) was sampled during three successive seasons (2002-04) in the Trondheimsfjord, Central Norway. Egg production (24 h) and hatching success (72 h) was determined by incubation experiments, and the essential fatty acid (EFA) content of their in situ food was analysed. The dominant EFA in the seston were DHA (22:6n-3) and EPA (20:5n-3), whereas ARA (20:4n-6) were present in low quantities. Egg production and hatching success was relatively low during early spring and late autumn (~ 10 eggs female⁻¹ day⁻¹ and ~ 30%), and relatively high during summer. Spring phytoplankton, dominated by diatoms, contained low amounts of DHA. Dinoflagellates, small flagellates, and ciliates dominated during summer, when a high content of DHA was recorded.

The rate of egg production of *T. longicornis* did not show any relationship with food concentration ($r^2 = 0.003$), but was positively correlated to temperature, although not statistically significantly ($r^2 = 0.48$, $p = 0.05$). The quantitative and percent DHA contents of the food was significantly related to the rate of egg production ($r^2 = 0.96$ and 0.95 , respectively, $p < 0.001$), but no such relationship were observed for the quantitative or percent content of EPA and ARA in the seston. The egg production of *T. longicornis* during May-August was 43-47 eggs female⁻¹ day⁻¹, with dietary DHA contents higher than 7-8 mg DHA g⁻¹ DW. Also the hatching success of *T. longicornis* was positively correlated to the quantitative content of DHA in the diet ($r^2 = 0.88$), but hatching was also inversely related to the percentage ARA ($r^2 = 0.84$). The maximum hatching success was found when the ARA content was < 0.15% of total fatty acids and the DHA:ARA ratio was > 50. The conclusion that DHA most strongly affected egg production whereas ARA affected hatching, fit well with earlier findings for fish. Our results do not exclude that toxic aldehydes interact with reproduction of calanoid copepods when diatoms are present, but we observed a consistent pattern where dietary DHA and ARA alone explained a majority of the variability in egg production and hatching of *T. longicornis*.

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EFFECTS OF SEDIMENTS ON LARVAL SETTLEMENT OF ABALONE HALIOTIS DIVERSICOLOR

Toshihiro Onitsuka, Tomohiko Kawamura, Satoshi Ohashi, Shunsuke Iwanaga, Toyomitsu Horii, Yoshiro Watanabe-2008

Journal of Experimental Marine Biology and Ecology 365(1): 53-58

Abstract:

The effects of deposited sediments on the settlement of the abalone *Haliotis diversicolor* Reeve were examined through both field observations and a laboratory experiment. Occurrences of newly settled post-larvae (shell length < 500 µm) and the amount of suspended and deposited sediments were monitored at two stations (Stns 1 and 2), which experienced different sediment deposition conditions, located at Nagai on the coast of Sagami Bay, Japan. Quantities of suspended sediments at the two stations varied considerably during the survey period, but no significant difference was detected between the stations. Mean volume densities of sediments deposited on cobbles were significantly higher at Stn 2 than at Stn 1. Densities of newly settled post-larvae from the 2001 to 2004 cohorts were significantly higher at Stn 1. A laboratory experiment was conducted to assess the effects of sediment quantity and quality on larval settlement. Two substances with different physical properties, kaolin and clamshell powder, were used as sediments. Larvae were subjected to four different sediment treatments with crustose coralline algae (CCA) substrates; thin and thick treatments for both kaolin and clamshell powder. Negative (without CCA) and positive (with CCA) controls without sediments were also established. The rate of metamorphosis decreased as sediment thickness increased in both the kaolin and clamshell powder treatments. Larvae in the kaolin treatments appeared to be trapped by the kaolin, and most could not metamorphose successfully. There were no trapped larvae in the clamshell powder treatments. The results indicate that the quantity and physical properties of sediments deposited on substrata affect the settlement and behaviour of larval abalone. Experimental results suggest that the lower densities of newly settled post-larvae observed at Stn 2 may have been a result of larger quantities of deposited sediments, which reduced the availability of suitable substrate for larval settlement.

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WATER RECIRCULATION AND GOOD MANAGEMENT: POTENTIAL METHODS TO AVOID DISEASE OUTBREAKS WITH FLAVOBACTERIUM PSYCHROPHILUM

L. Madsen, I. Dalsgaard-2008

Journal of Fish Diseases 31(11): 799 – 810

Abstract:

Flavobacterium psychrophilum infections cause high mortality among rainbow trout, *Oncorhynchus mykiss*, fry in Danish fish farms and hatcheries. Hatcheries based entirely on bore-hole water recirculation systems have been suggested as a possibility for eliminating *F. psychrophilum* or at least keeping the amount of this bacterium low. The occurrence of the bacterium in a bore-hole water recirculation system was compared with a combined bore-hole water and stream water flow-through system in a hatchery where outbreaks of rainbow trout fry syndrome caused by *F. psychrophilum* often occurred. Broodfish, unfertilized and fertilized eggs, eyed eggs and fry, as well as water samples from the tanks/troughs with broodfish/fry, were examined. Suspect yellow bacterial colonies were either confirmed or rejected as *F. psychrophilum* by growth characteristics and by PCR. As both virulent and less virulent *F. psychrophilum* isolates are known, isolates were characterized. The isolates were ribotyped and grouped according to ribotyping patterns. Representatives of the groups were serotyped. Fry isolates were very homogeneous whereas isolates from broodfish were heterogeneous, whether the isolates originated from external surfaces of the fish (mucus from skin and gills, haemorrhages and ulcers) or internal organs. *Flavobacterium psychrophilum* was isolated from

broodfish in both water systems; 56% of investigated broodfish from the borehole/flowthrough system and 36% from the recirculation facility harboured the bacterium. In the recirculation system, the bacterium was isolated from fish (ulcers, milt, liver, abdominal cavity) kept in the system for 11 months. *Flavobacterium psychrophilum* was found in milt and ovarian fluid as well as on the surface of fertilized eggs, but not inside the eggs. Fry also harboured *F. psychrophilum*, but in the water recirculation system the bacterium was first isolated from the fry after they had been graded. *Flavobacterium psychrophilum* was found regularly in other parts of the hatchery (outside the recirculation facility), including at the time of grading, suggesting that the occurrence of *F. psychrophilum* in the fry recirculation facility was due to contamination from the borehole/flowthrough hatchery. It is suggested that the combination of bore-hole water recirculation systems and good management procedures (including egg disinfection) is a possible method for hatcheries to avoid disease outbreaks due to *F. psychrophilum*.

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REVIEW ARTICLE

STUDIES ON THE ULTRASTRUCTURE OF SPERMIOGENESIS AND SPERMATOZOON OF TONGUE FISH, *CYNOGLOSSUS SEMILAEVIS* GÜNTHER

Yingying Wu, Xuezhou Liu, Qingyin Wang, Yongjiang Xu, Zhenmin Bao-2008

Aquaculture Research 39(14): 1467 – 1474

Abstract:

Ultrastructures of spermiogenesis and spermatozoon of commercially valuable tongue fish *Cynoglossus semilaevis* Günther were investigated by means of transmission electron microscopy. The study shows that the spermiogenesis of *C. semilaevis* can be divided into four stages, and the course of spermatid differentiation included flagellum development, chromatin compaction, nuclear fossa formation, migration of diplosome and mitochondria with structural change and disappearance of residual cytoplasm. No acrosome was observed in spermatozoon of *C. semilaevis*. The nucleus of sperm was U-shaped; the nuclear fossa was deep with a centriolar complex at the bottom composed by proximal centriole and basal body. Five to six mitochondria were located behind the nucleus in a circle, forming the midpiece of sperm. The sperm tail, $43 \pm 2.4 \mu\text{m}$ ($n=5$) long, had lateral fins and sacciform tissues in some parts of the tail, with axoneme shown of a typical '9+2' pattern. The ultrastructural observation revealed that the sperm of *C. semilaevis* is of a primitive type among teleostean fish species.

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MICROSATELLITE GENETIC VARIATION IN WILD AND HATCHERY POPULATIONS OF THE SEA CUCUMBER (*APOSTICHOPUS JAPONICUS* SELENKA) FROM NORTHERN CHINA

Limei Chen, Qi Li, Jianmin Yang-2008

Aquaculture Research 39(14): 1541 – 1549

Abstract:

Farming of the sea cucumber *Apostichopus japonicus* (Selenka) started 20 years ago and is still in rapid expansion in China. In order to assess the genetic status of both wild and cultivated stocks of this species, we used eight microsatellite markers to estimate the level of genetic diversity within five hatchery stocks and two wild populations of *A. japonicus*, and compared the degree of genetic differentiation between them. High levels of polymorphism were observed over all loci. The mean alleles and expected heterozygosities over the seven stocks were 10.4–12.3 and 0.735–0.783 respectively. The results of the microsatellite survey provide no evidence to show that hatchery practice of the sea cucumber in China to date has significantly affected the genetic variability of the cultured stocks. Significant differentiation was found between most pairs of the hatchery stocks and wild populations (F_{st} range: 0.008–0.036), and no obvious difference was detected between the wild populations ($F_{st}=0.008$). The information on the genetic variation and differentiation obtained in this study can be applied for future genetic monitoring of *A. japonicus* aquaculture stocks and will be

useful for future genetic improvement by selective breeding, and for designing suitable management guidelines for these genetic materials.
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