

PENAEUS INDICUS EGG SALINITY

QUESTION:

From: Ghobad Mokarami ghmokarami@yahoo.com

To: shrimp@yahoogroups.com

Date: 8 July 2007

Could you introduce, some Scientific paper that describe about limited salinity for hatching eggs of Penaeidea shrimp (in the case of impossible hatching ender 20 ppt) ?

COMMENTS 1:

28 ppt Would be the minimum as for other specials. Ideally, keep it at 30 ppt in my opinion.

Laurence Evans

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COMMENTS 2:

Here we are going to improve shrimp farming in new site that have more than 10 years successful result in research scale. Salinity from inlet is less than 13 ppt (salt water lake) and environmental organization concerns for introduce shrimps to natural water and its reproduction so we need to some documents, article ... that confirm eggs of Penaeid shrimp unable to hatch , naturally in the salinity under 20 ppt. But I can not find some text or paper that show this case clearly.

Ghobad Mokarami

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COMMENTS 3:

I totally agree. I prefer full strength ocean water (34 ppt) for my P. monodon, P. indicus, P. merguensis, P. stylirostris and P. vannemei being the species I have worked with, but more particularly P. monodon. Mind you, there are papers, articles and claims about that prescribe low salinity, almost fresh water, but I would not give much credence. If you are going to grow salt water animals, then use salt water! I have never had a problem with that. If I recall correctly full strength was used in Mtunzini and Amatikulu also.

Alec Forbes

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REVIEW ARTICLE

ANTIMICROBIAL USE IN SHRIMP FARMING IN ECUADOR AND EMERGING MULTI-RESISTANCE DURING THE CHOLERA EPIDEMIC OF 1991: A RE-EXAMINATION OF THE DATA

Peter Smith-2007

Aquaculture 271(1-4): 1-7

Abstract:

In 1991, the 7th cholera pandemic reached Ecuador. During this epidemic, the emergence of multi-resistance strains of *V. cholerae* was observed. It has been argued that the use of antimicrobials in Ecuadorian shrimp farms was causally related to this emergence of multi-resistance in a human pathogen and that this linkage provides important evidence that must be incorporated into any assessment of the risks to human health presented by use of antimicrobials in aquaculture.

This review re-examines the data that has been published concerning the epidemic and the emergence of resistance in Ecuador. It reports that none of the available data provides credible support for the claim that antimicrobial agent use in shrimp farms played a significant role in either the epidemic or in the emergence of multi-resistant human pathogens. It concludes that our knowledge of the events that occurred in Ecuador in 1991 can add nothing to our understanding of the risks associated with the use of antimicrobials in aquaculture.

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GENETIC DIVERSITY OF HATCHERY STOCKS OF GIANT FRESHWATER PRAWN (MACROBRACHIUM ROSENBERGII) IN THAILAND

Kancee Chareontawee, Supawadee Poompuang, Uthairat Na-Nakorn, Wongpathom Kamonrat-2007

Aquaculture 271(1-4): 121-129

Abstract:

The culture of freshwater prawn in central Thailand has experienced low productivity despite the rapid expansion during the past several years. Deterioration of genetic variation and inbreeding depression were blamed for slow growth rate in farmed stocks. Six microsatellite DNA loci were used to assess genetic diversity from five hatchery stocks and two wild populations of freshwater prawn. Natural populations were collected from the ChaoPhaya River and the Kraburi River. Two local hatchery populations originated from the ChaoPhaya River were collected from the provinces of Nakorn Pathom and Supanburi. Another ChaoPhaya originating samples were obtained from a hatchery in Indonesia. An introduced stock of Myanmar origin was sampled from a hatchery in Nakhon Pathom province and samples of a commercial strain which originated from India were collected in Ratchaburi province. All hatchery and wild populations exhibited relatively high genetic variation and were similar with an average of 7.50 to 10.67 alleles per locus and average expected heterozygosity at all loci of 0.64 to 0.73. Pair-wise comparisons and the F_{ST} values revealed significant genetic differentiation across all populations. Results indicated that poor performance of freshwater prawn due to deterioration of genetic variability and inbreeding was not an issue.

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USE OF PERIPHYTIC CYANOBACTERIUM AND MIXED DIATOMS COATED SUBSTRATE FOR IMPROVING WATER QUALITY, SURVIVAL AND GROWTH OF PENAEUS MONODON FABRICIUS POSTLARVAE

Helena Khatoon, Fatimah Md. Yusoff, Sanjoy Banerjee, Mohamed Shariff, Suhaila Mohamed-2007

Aquaculture 271(1-4): 196-205

Abstract:

An eco-friendly method was established by using periphyton coated substrate (a cyanobacterium or mixed diatoms) to improve water quality, survival and growth of *Penaeus*

monodon postlarvae (PL) in a shrimp hatchery system without changing water. Polyvinyl chloride (PVC) pipes (2 cm × 2 cm) were used as the substrate to grow pure cultures of cyanobacterium and diatoms. *P. monodon* (PL1) were cultured in 40 L glass tanks containing 30 L filtered-seawater and stocked at a density of 50 PLs L⁻¹. Two treatments using i) cyanobacterium coated substrate (*Oscillatoria*), ii) mixed diatoms coated substrate (*Amphora*, *Navicula* and *Cymbella*), and a control (without substrate) were employed in this experiment. The experiment was run in triplicate for a period of 16 days (PL16) whereafter the PLs are normally stocked in growout ponds. Tanks with *Oscillatoria* coated substrate had the lowest ($P < 0.05$) concentrations of total ammonia nitrogen (TAN, 0.03 ± 0.0 mg L⁻¹); nitrite-nitrogen (NO₂-N, 0.01 ± 0.0 mg L⁻¹) and soluble reactive phosphorus (SRP, 0.05 ± 0.0 mg L⁻¹) in comparison to mixed diatoms (0.82 ± 0.02 ; 0.52 ± 0.05 ; 0.35 ± 0.01 mg L⁻¹ for TAN, NO₂-N and SRP, respectively) and control tanks (1.14 ± 0.01 ; 0.80 ± 0.02 ; 0.53 ± 0.04 mg L⁻¹ for TAN, NO₂-N and SRP, respectively). In addition, nutrients in diatoms treated tanks were significantly lower ($P < 0.05$) than the control. *Oscillatoria* was more effective in reducing TAN (1.40 g m⁻² day⁻¹), NO₂-N (0.07 g m⁻² day⁻¹) and SRP (0.06 g m⁻² day⁻¹) than the mixed diatoms. Furthermore, shrimp cultured in tanks containing periphyton coated substrate showed significantly higher survival ($51.3 \pm 0.6\%$ – $60.0 \pm 1.1\%$) than those reared in the periphyton free control tanks ($36.8 \pm 0.3\%$). The specific growth rates (dry weight) of the PLs was the highest in the diatoms tanks ($28.02 \pm 0.01\%$) followed by the *Oscillatoria* ($22.83 \pm 0.03\%$) and the control tanks ($19.83 \pm 0.05\%$) ($P < 0.05$). The PLs produced in both substrate based systems exhibited higher resistance to reverse salinity stress test than those reared in the control tanks (36.7 ± 4.1 to $43.3 \pm 8.2\%$ survival compared to $26.7 \pm 8.2\%$) ($P < 0.05$). The protein, lipid and carbohydrate levels in PLs reared in tanks with mixed diatoms coated substrate were higher than for PLs grown in control tanks. This study illustrated the beneficial effects of periphyton coated substrate in improving water quality, growth and survival of shrimp larvae grown in shrimp hatchery system without water exchange.

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STORAGE OF CAIMAN LATIROSTRIS (CROCODYLIA: ALLIGATORIDAE) EGGS IN HARVEST CONTAINERS: EFFECTS ON HATCHABILITY

C.I. Piña, M. Simoncini, P. Siroski, A. Larriera-2007

Aquaculture 271(1-4): 271-274

Abstract:

In crocodilian ranching operations wild eggs are collected from the field, and delays between collection and transportation to incubators are usually minimized in the hope of maximizing embryo survival. In the ranching program for *Caiman latirostris* in Santa Fe, Argentina, gauchos do not collect eggs on the day nests are found, but rather on the day before the collectors arrive to pick them up and transport them to incubators. This is based on the untested assumption that the probability of increased mortality in the wild nests would be less than that likely to be encountered if eggs were collected on the day they were found and stored in the gaucho's house. This study tested whether storing the eggs in the houses for between 0 and 16 days, had any significant effect on hatching success. None could be demonstrated, suggesting that eggs should be collected when they are found, thereby avoiding risks of predation and flooding in the field prior to collection.

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UTILITY OF SEA URCHIN EMBRYO-LARVAL BIOASSAYS FOR ASSESSING THE ENVIRONMENTAL IMPACT OF MARINE FISHCAGE FARMING

Arnaldo Marin, Sara Montoya, Rubén Vita, Lázaro Marín-Guirao, Javier Lloret, Felipe Aguado-2007

Aquaculture 271(1-4) : 286-297

Abstract:

The environmental impact of two fish farms was assessed by larval toxicity bioassays using the sea urchin *Paracentrotus lividus*. Larval toxicity bioassays have become important for regulatory and monitoring programs, largely because they are assumed to be good indicators of ecological damage to benthic infaunal communities. The study was conducted in two Mediterranean fish farms which produce gilthead sea bream (*Sparus aurata*) and tuna (Tunna tuna), respectively. The data obtained from sediment toxicity tests and the physico-chemical characteristics of sediment were examined in two farming production periods to determine the relationships between toxicity and sediment impact.

In the gilthead sea bream fish farm, only the sampling stations located at 0 and 35 m were classified as toxic (significant differences from control, $p < 0.05$) during the winter campaign. A more pronounced toxicity gradient was observed during summer sampling, toxicity being significantly higher in sampling stations 0, 35 and 55 m down current from the fish cages. In the tuna farm, a seasonal toxicity pattern was observed associated to fish farming activity. Most of the stations sampled during the production period showed a highly toxic response (0 m to 125 m from fish cages), while stations further away from the fish farm (175 m to 330 m from fish cages) showed no toxic response. No stations exhibited significant toxicity during the fallow period.

Sea urchin larval toxicity was significantly correlated with sulphides and seasonally, with total ammonia nitrogen in both fish farms. The results reported here are promising and indicate that embryo-larval bioassays with the sea urchin *P. lividus* represent a sensitive tool for describing the environmental impact of fish farming.

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EFFECT OF DELAYED INITIAL FEEDING ON GROWTH AND SURVIVAL OF ASIAN SEA BASS LATES CALCARIFER (BLOCH) LARVAE

M. Kailasam, A.R. Thirunavukkarasu, S. Selvaraj, P. Stalin-2007

Aquaculture 271(1-4): 298-306

Abstract:

This study investigated the influence of delayed initial feeding on growth and survival of Asian sea bass *Lates calcarifer* larvae under controlled conditions. Growth parameters were evaluated by assessing morphometric characteristics of the larvae. Two experiments were conducted at different initial feeding time (48 h, 72 h, 96 h and 120 h) as follows: experiment 1 was conducted to evaluate the morphometric characteristics (total length, head depth, body depth, eye diameter, gut height, musculature height, yolk and oil globule volume) under different initial feeding time. Sea bass larvae initiated first feeding at 96 h and 120 h after hatching have achieved comparatively lesser growth in total length and total weight than that of 48 h and 72 h. The morphometric characteristics of 5 DPH larvae had significant differences between 48 h and 120 h initial feeding. Similarly, significant differences were noticed between 48 h and 96 h initial feeding for all the morphometric characteristics except gut height. In 11 DPH larvae, significant differences were observed only between 48 h and 96 h for all the morphometric characteristics and it was not significant between 48 h and 72 h initial feeding. It was also observed that the yolk absorption in sea bass larvae was completed by 96 h irrespective of the differences in the initial feeding. Similarly, oil globule was completely utilized at 120 h after hatching. There was no significant difference in the yolk volume and oil globule utilization of 1 DPH and 2 DPH larvae among different treatments. The yolk volume of 3 DPH larvae initiated first feeding at 48 h ($0.0122 \pm 0.0008 \text{ mm}^3$) and 72 h ($0.0110 \pm 0.0008 \text{ mm}^3$) had significant differences with yolk volume of larvae initiated

first feeding at 96 h (0.0098 ± 0.0006 mm³) and 120 h (0.0096 ± 0.0003 mm³). However, the oil globule of 4 DPH did not vary significantly between the treatments.

Experiment 2 was carried out to find out the impact of delayed initial feeding on the survival rate. Sea bass larvae were initiated first feeding at 48 h, 72 h, 96 h and 120 h under different treatments and after 21 days rearing, survival rate was estimated. Survival rate was higher when the sea bass larvae initiated initial feeding at 48 h (31.46%) when compared to 72 h (21.18%) and 96 h (8.42%). Complete mortality was recorded on 9 DPH for the larvae initiated first feeding at 120 h. Significant differences were observed between the treatments. The present study suggests that the first feeding of sea bass larvae must be initiated at 48 h for yielding better growth and survival.

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SURVIVAL, GROWTH AND DIGESTIVE ENZYME ACTIVITY OF JUVENILES OF THE FAT SNOOK (CENTROPOMUS PARALLELUS) REARED AT DIFFERENT SALINITIES

Mônica Y. Tsuzuki, Juliet K. Sugai, Julio Cesar Maciel, Claire J. Francisco, Vinícius R. Cerqueira-2007

Aquaculture 271(1-4): 319-325

Abstract:

The effect of salinity on survival, growth and activity of digestive enzymes was evaluated in the fat snook (*Centropomus parallelus*). Juveniles of 76 days after hatching (0.35 g) were reared at 5, 15 and 35 ppt, in triplicate, for 50 days, at 0.6 fish/l. Snook presented excellent survival (> 93.3%) at 5, 15 and 35 ppt, demonstrating the euryhalinity of the species. At the end of the experiment, no differences in weight and specific-growth rates (mean 1.8%/day) were observed, however, total and standard length values were higher at 15 ppt when compared to those at 5 ppt ($P > 0.05$). The best results in food conversion ratio (1.3) and digestive enzymes activity were obtained at 15 ppt. The activity of total alkaline proteinase was significantly affected at this salinity (0.124 ± 0.006 Δ absorbance₃₆₆ nm/min/ml/mg protein), being two-fold and six-fold higher, compared to 35 and 5 ppt, respectively. The activity of total amylase was higher at 15 and 35 ppt (mean 0.016 ± 0.001 μ mol reducing sugar/min/ml/mg protein), compared to 5 ppt ($P < 0.05$). Results indicate that fat snook reared at 15 ppt presented a higher potential for a more efficient digestibility and nutrient absorption, especially proteins. Additionally, at this salinity, the energetic demand for osmoregulation is probably reduced by the isosmotic medium, leading to growth enhancement. In terms of production costs, feeding expenses can be lowered at this salinity due to a better food conversion ratio.

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DELETERIOUS EFFECTS OF FOOD RESTRICTIONS IN YELLOWTAIL KINGFISH SERIOLA LALANDI DURING EARLY DEVELOPMENT

Ben Nan Chen, Jian G. Qin, John F. Carragher, Steven M. Clarke, Martin S. Kumar, Wayne G. Hutchinson-2007

Aquaculture 271(1-4): 326-335

Abstract:

The effects of delayed first feeding and food deprivation on the structure and function of the digestive system in yellowtail kingfish *Seriola lalandi* larvae and juveniles were studied through histological examinations and enzymatic analyses. The experimental design included

a conventional feeding regime with initial feeding from 3 days after hatching (DAH) as a control, delayed first feeding until 5 DAH, a first 3-d food deprivation from 12 to 15 DAH, and a second 3-d food deprivation from 33 to 36 DAH. Fish samples for histological and enzymatic analyses were taken on 5, 15, and 36 DAH, respectively. The delay of first feeding and a 3-d food deprivation on 15 DAH significantly reduced the height of enterocyte cells in the midgut, but a 3-d food deprivation on 36 DAH did not significantly reduce the cell height. Lipid vacuoles and supranuclear vacuoles disappeared from the epithelial cells after the fish had experienced the delay of first feeding or a 3-d food deprivation on 15 DAH. Total and specific activities of trypsin and amylase were reduced by the delay of first feeding. The 3-d food deprivation on 15 DAH reduced specific activities of trypsin, amylase and alkaline phosphatase, and total activity of amylase, but the 3-d food deprivation on 36 DAH only reduced the amylase activity. This study indicates that yellowtail kingfish larvae are more vulnerable to starvation in the first 2 weeks after the start of first feeding but fish become more tolerant to a short-term starvation after 33 DAH. Therefore, any delay of feeding during the first 2 weeks may impair histological structure and cause malfunction of the digestive system in yellowtail kingfish larvae. Our data also suggest that the enterocyte morphology, the number of supranuclear vacuoles in the intestine and the activity of digestive enzymes can be used as indicators of the nutritional condition of fish larvae.

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THE EFFECT OF DIFFERENT SUBSTRATES ON PEARL OYSTER PINCTADA MARTENSII (DUNKER) LARVAE SETTLEMENT

Zhenxia Su, Liangmin Huang, Yan Yan, Hengxiang Li-2007

Aquaculture 271(1-4): 377-383

Abstract:

In the present study, the effect of various substrata on the settlement of a pearl oyster, *Pinctada martensii*, was evaluated. The settlement of the larvae in the experiments with four different color substrata was compared and showed that deep color plastic sheets (red and blue) attracted significantly more larvae ($P < 0.05$) than light color (green and yellow). In addition, the influence of biofilm substrata was compared with that of non-film substrata of smooth or rough texture. Number of settled larvae was highest on biofilmed plastic sheets, either rough or smooth, then rough plastic sheets without film, the least recorded was on smooth plastic sheets without biofilm. Substrates of plastic sheets coated with tissue extracts of the same species appeared to attract larval settlement. The number of settled larvae on substrates with tissue extracts was significantly greater ($P < 0.05$) than that on the control.

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THE INGESTION RATE OF LITOPENAEUS VANNAMEI LARVAE AS A FUNCTION OF TISBE BIMINIENSIS COPEPOD CONCENTRATION

Lilian C.M. de Lima, Lília P. Souza-Santos-2007

Aquaculture 271(1-4): 411-419

Abstract:

Artemia nauplius is the food usually used in the culture of *Litopenaeus vannamei* larvae. However, the production of *Artemia* cysts does not always meet the increasing demands of aquaculture. Thus, alternative diets need to be tested. The objective of this study was to determine the ingestion rate of the *L. vannamei* larvae fed on different offspring concentrations of *Tisbe biminiensis*, composed of nauplii and copepodites, and to estimate the best food concentration. Two types of ingestion rate experiments were made: one using flat bottom flasks without aeration, and another with conic bottom flasks with aeration. In the first

type, larvae in the mysis 2 and 3 stages and postlarvae 1, 3, 5 and 7 were stocked individually in vessels containing 50 ml of seawater. In the other type, groups of 6 larvae in the stages mysis 2 and 3 were stocked in vessels containing 300 ml of seawater. In both experiments, the vessels containing seawater of salinity 31–33 were incubated for 24 h, at 25–30 °C and the photoperiod of 13 h light/11 h dark. Four treatments were tested with different copepod offspring concentrations as well as controls without shrimp larvae. In addition, controls using *Artemia* nauplii as food were also used to verify the physiological condition of tested larvae. In experiments using conic bottom flasks with aeration, the best concentration of copepods was about 5 copepod ml⁻¹ for mysis 2 and 3, respectively. The mean ingestion rate was 56.7 ± 9 and 188 ± 203 copepod larva⁻¹ day⁻¹ for mysis 2 and 3, in that order. In the other type of experiment, mysis 2 did not ingest copepods and mysis 3 ingested only 24.5 ± 10 copepod larva⁻¹ day⁻¹. In postlarval stages, the best concentration of copepod was about 10 copepod ml⁻¹ for postlarvae 1 to 3 and 20 copepod ml⁻¹ for postlarvae 5 to 7. The mean ingestion rate was 185 ± 69 copepod larva⁻¹ day⁻¹ for postlarva 1, 229 ± 45 copepod larva⁻¹ day⁻¹ for postlarva 3, 342.8 ± 98 copepod larva⁻¹ day⁻¹ for postlarva 5 and 293 ± 45 copepod larva⁻¹ day⁻¹ for postlarva 7. The results indicated some preference for naupliar over copepodite stages. To conclude, the offspring of *T. biminiensis* copepod were ingested by *L. vannamei* larvae in the mysis and postlarval stages and the ingestion rate increased with larval development. Thus, the offspring of *T. biminiensis* copepod are a potential live food to be tested in larviculture of *L. vannamei*.

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EFFECT OF DIETARY CANOLA OIL LEVEL ON THE GROWTH PERFORMANCE AND FATTY ACID COMPOSITION OF JUVENILE RED SEA BREAM, *PAGRUS MAJOR*

S.S.Y. Huang, A.N. Oo, D.A. Higgs, C.J. Brauner, S. Satoh-2007

Aquaculture 271(1-4): 420-431

Abstract:

This study was undertaken to evaluate the suitability of using refined canola oil as a source of supplemental dietary lipid for juvenile red sea bream (*Pagrus major*). Triplicate groups of 25 red sea bream fingerlings held under identical culture conditions (25 °C, aerated, re-circulated artificial seawater, 30 g/L; 12-h light/12-h dark photoperiod) were fed three times daily to satiation one of four diets with equivalent protein (46%), energy (21.9 MJ/kg) and lipid (15%) content on a dry weight basis for 12 weeks. The diets were identical in composition except refined canola oil (CO) replaced either 0%, 33%, 67%, or 100% of the supplemental dietary lipid content with the remainder originating from pollock liver oil (FO). Thus CO comprised either 0% (diet FO), 25% (CO25), 48% (CO48), or 70% (CO70) of total dietary lipid content. Fish weight gain, specific growth rate, feed intake, feed efficiency, protein and gross energy utilization, and percent survival were not affected by diet treatment. Except for percent moisture which was depressed in CO48 and CO70-fed fish, concentrations of terminal whole body proximate constituents were similarly uninfluenced by diet treatment. Dietary lipid compositions reflected the proportions of CO and FO in supplemental lipid and their respective fatty acid compositions. Whole body fatty acid compositions mirrored those of diet treatments. However, liver polar lipids of the fish suggested, some essential fatty acids such as eicosapentaenoic acid, docosahexaenoic acid and arachidonic acid were preferentially incorporated and regulated, which resulted in a relatively lower degree of difference between diet treatments compared to what was found in whole body lipid. Our findings suggest that refined canola oil is a suitable dietary lipid source for juvenile red sea bream under our test conditions. However, chronic assessments of CO as a supplemental dietary lipid source for red sea bream are warranted to ensure that similar results are obtained without adverse effects on fish health.

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DIGESTIVE PHYSIOLOGY AND METABOLISM OF GREEN ABALONE HALIOTIS FULGENS FROM POSTLARVAE TO JUVENILE, FED THREE DIFFERENT DIATOMS

María Teresa Viana, Gabriel Correa, Juan Pablo Lazo, Roger Frías-Díaz, Eduardo Durazo-Beltrán, Carlos Vasquez-Pelaez-2007

Aquaculture 271(1-4) : 449-460

Abstract:

Growth, survival, digestive enzymes, ingestion rates, digestibility, fatty acid profile and energy budget were used to assess the nutritional quality of three diatoms as food for the first 3 months of age: *Navicula incerta* (NAV), *Amphiprora paludosa* (AMP), *Nitzschia thermalis* (NIT) and a combination of all three species (MIX). The highest growth was observed for postlarvae fed the MIX ($51.37 \mu\text{m day}^{-1}$ and $0.578 \pm 0.1 \text{ mg day}^{-1}$), but was not significantly different from the NAV treatments ($46.60 \pm 3.4 \mu\text{m day}^{-1}$ and $0.550 \pm 0.1 \text{ mg day}^{-1}$).

Abalone larvae, which are lecithotrophic organisms, seem to utilize proteins as a preferred energy substrate up to metamorphosis, since the relative lipid content increased from 15 to 30% from days 0 to 10. Thereafter, lipids are rapidly utilized and decreased to a level of 2% of the dry matter in the postlarvae whole soft tissue. Tissue fatty acid analysis indicated a similar trend among treatments, where relative fatty acid levels increased during the endogenous feeding period and started to decrease concomitant with the start of the exogenous feeding. Polyunsaturated fatty acids, reported on abalone tissue showed a similar trend, among treatments.

Based on the results reported here, it can be concluded that the type of diatom is an important factor for growth, where a high lipid and low ash content could be important to improve the performance in terms of growth and survival, in combination to stimulate protease activity and therefore better digestibility. Last but not the least important, the use of monoculture with NAV will be of importance when culturing abalone postlarvae. The estimated energy budget, back calculated from the digestibility figures, indicates that abalone requires from 25 to 38 cal day⁻¹ g abalone⁻¹ for adequate growth.

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EFFECTS OF A GONADOTROPIN-RELEASING HORMONE ANALOG COMBINED WITH PIMOZIDE ON PLASMA SEX STEROID HORMONES, OVULATION AND EGG QUALITY IN FRESHWATER-EXPOSED FEMALE CHUM SALMON (*ONCORHYNCHUS KETA*)

WooDong Park, Cheul Ho Lee, Chae Sung Lee, Dae-Jung Kim, Jeong-Ho Kim, Clyde S. Tamaru, Young Chang Sohn-2007

Aquaculture 271(1-4): 488-497

Abstract:

In October 2004 and 2005, sexually maturing chum salmon (*Oncorhynchus keta*) captured by stationary nets in seashore areas of Yang-yang, Gangwon, Korea, were transferred to freshwater and kept over 24 h. To accelerate final maturation and ovulation, the freshwater-exposed female fish were injected intraperitoneally with a single dose of gonadotropin-releasing hormone analog (GnRH_a) ($70 \mu\text{g/kg BW}$) alone or combined with a dopamine antagonist, pimozide (PIM) ($700 \mu\text{g/kg BW}$). The effects of GnRH_a and PIM on the induction of ovulation, the percentages of eyed embryos and hatched alevins were examined together

with plasma steroid hormone levels. In the fish treated with GnRH α alone or GnRH α combined with PIM (GnRH α + PIM), the percentage of ovulated females increased on the 5th and 7th days post-injection (38–100%) compared to that of a vehicle only treated group (10–36%) in both 2004 and 2005. By the 7th day of GnRH α and GnRH α + PIM treatment, the percentages of eyed embryos and hatched alevins (79–90% and 50–85%, respectively) were comparable to those of vehicle-treated fish (59–89% and 37–85%). Plasma levels of estradiol-17 β (E2) and testosterone exhibited a decreasing pattern with increased duration in freshwater in vehicle-injected fish. In addition, plasma E2 levels were observed to be lower in the GnRH α - and GnRH α + PIM-treated groups than those of a vehicle-treated group over the same time period. The results suggest that temporal freshwater-exposure itself may influence the plasma E2 levels and an additional treatment of GnRH α and PIM acts as a reducer for the lowered E2 levels in freshwater-exposed fish. In contrast, plasma 17 α 20 β -dihydroxy-4-pregnen-3-one levels dramatically increased in the hormone-treated groups throughout the examined period. The present study indicates that administration of GnRH α alone or GnRH α + PIM is effective for induction of sexual maturation and ovulation in freshwater-exposed female chum salmon and dopaminergic inhibition occurs in the maturing salmon. These treatments using hypothalamic hormones for freshwater-exposed female could be applied to the development of a method for artificial propagation of salmon seed without a marked deterioration of the egg quality.

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CRYOPROTECTANT OPTIMIZATION FOR SPERM OF DIPLOID PACIFIC OYSTERS BY USE OF COMMERCIAL DAIRY SPERM FREEZING FACILITIES

Qiaoxiang Dong, Changjiang Huang, Benoit Eudelin, Terrence R. Tiersch-2007

Aquaculture 271(1-4): 537-545

Abstract:

Although sperm cryopreservation has been practiced in aquatic species for more than 50 years, viable markets for frozen sperm do not currently exist for commercial aquaculture. The present study suggests that the use of commercial cryopreservation facilities used for dairy bulls could be a cost-effective approach to initiate commercialization of frozen sperm in aquaculture, and the oyster industry could become one of the early adopters. To prove the technical feasibility of the use of a commercial freezing facility, this study adopted dairy freezing methods and emphasized cryoprotectant optimization for sperm from diploid Pacific oysters *Crassostrea gigas* with specific cooling methods employed for use with bull sperm. Specifically, the present study evaluated dimethyl sulfoxide (DMSO) at 5, 8, and 10%, ethylene glycol (E-glycol) at 2, 5, 8, and 10%, and methanol at 2, 4, 6, and 8%. Each cryoprotectant with its optimal concentration was chosen for subsequent selection of an optimal cryoprotectant. Previous results showed propylene glycol (P-glycol) at 5% yielded higher percent fertilization than did PG at 10 or 15%. Therefore, 5% of these cryoprotectants were compared and the highest percent fertilization was obtained with methanol (49 \pm 29%), followed by E-glycol (42 \pm 15%), DMSO (31 \pm 18%), and P-glycol (22 \pm 12%). Extensive evaluation for single and combined cryoprotectants and their concentrations were studied in our previous trials on a research scale (reported elsewhere), and 6% methanol and the combination of 4% methanol and 2% polyethylene glycol (PEG; FW 200) were shown to consistently yield the highest percent fertilization. Our last commercial-scale experiment compared 6% methanol with the combination of 4% methanol and 2% PEG (MET/PEG) with 20 oysters. There was no significant difference for percent fertilization between 6% methanol (39 \pm 29%) and 4% MET/2% PEG (42 \pm 26%). These findings demonstrate the technical feasibility of adopting dairy freezing protocols in commercial application for oyster sperm, and also provide a template for future commercialization of sperm cryopreservation for other aquatic species.

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TEMPERATURE AND SALINITY EFFECTS ON PLASMA INSULIN-LIKE GROWTH FACTOR-I CONCENTRATIONS AND GROWTH IN JUVENILE TURBOT (SCOPHTHALMUS MAXIMUS)

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Abstract:

The effects of temperature and salinity on plasma IGF-I levels and its interrelationship with growth, daily feed intake and feed conversion of juvenile turbot (initial mean weight 14 g) were investigated by rearing fish at 10, 14, 18 and 22 °C and 15, 25 and 33.5‰ for 3 months.

The plasma IGF-I levels increased with increasing temperatures reaching a plateau around 18 °C. Further, both temperature and salinity had a significant effect on growth, daily feed intake and feed conversion efficiency in juvenile turbot. Growth, food consumption, and food conversion efficiency were highest at 18 °C and 15‰, and lowest at 10 °C and 33.5‰. Although there was a high variation between IGF-I values within all groups there was a positive relationship between IGF-I levels and specific growth rates and daily feed intake. The levels of IGF-I were almost three times higher for fish with higher growth rates than for those with lower growth. In addition, the results show evidence for an increased appetite in fish with high plasma IGF-I levels. Interestingly, there was no correlation between environmental salinity and IGF-I levels, although decreased salinity improves growth and feed conversion efficiency.

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