INFORMATION OF INTEREST

The importance of fish and DHA in Alzheimer disease – Am. J. Clinical Nutrition 2007

Profet Policy workshop "Coldwater Marine Aquaculture Workshop, Bergen (Norway), March 15-16 2007: presentations

Soy in aquaculture newsletter: info on the use of soybean products in the aquaculture industry

Speech of U.S. Secretary of Commerce at the International Boston Seafood Show, March 12, 2007

2007 USA National Offshore Aquaculture Act

e-Newsletter The FishSite Latest News

Technical efficiency of prawn farms in the Mekong Delta, Vietnam: conference paper by Do Thi Den et al., 2007

The Biofloc Workgroup of the Aquacultural Engineering Society has a new website with several conference presentations (San Antonio 2007, Firenze 2006, Las Vegas 2006 and Roanoke 2006)

Feed Technology Update April 2007 – free electronic newsletter

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PROBLEMS WITH MOLT IN MYSIS III – PL STAGES
FROM: Jaime Malagamba Ansotegui jjmalagamba@yahoo.com.mx
TO: shrimp@yahoogroups.com
SENT: 12 May 2007

QUESTION:
I have a hatchery in La Paz, BCS Mexico and work in another hatchery in Ciudad Obregon, Sonora. In this last hatchery we are having problems with the molt in mysis III - PL stage, the muscle turns pale, and the larvae die with the molt on, our usual survival rate in Pl 12 is 50 to 55%; with this problem it is about 25%. The larvae that survive look pretty well, and perform excellent in the ponds. We have this problem also sometimes in PL4 or even PL8.

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COMMENTS 1:
Molt problems normally are due to :
1. water quality
2. poor nutrition or unbalance diet
3. Vibrio sp.
I have experienced problems also during these stages and lowering salinity from Z2 to PL1, change probiotic source or brand and keep a balance nutrition since Z1 (algae and dry or liquid diets) has avoided this problem. You must know EDTA levels effective for your water source during different seasons to avoid water total hardness as a problem for molt.
jaime baquerizo baquerizojaime@yahoo.com

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COMMENTS 2 :
Try to find a product named LIPTOCITRO commercialized by the Spanish company LIPTOSA.
Alberto Olias a.olias@liptosa.com

MINI-REVIEW:
OUTDOOR CULTIVATION OF MICROALGAE FOR CAROTENOID PRODUCTION: CURRENT STATE AND PERSPECTIVES
José A. Del Campo, Mercedes García-González, Miguel G. Guerrero-2007
Applied Microbiology and Biotechnology 74(6): 1163-1174
Abstract:
Microalgae are a major natural source for a vast array of valuable compounds, including a diversity of pigments, for which these photosynthetic microorganisms represent an almost exclusive biological resource. Yellow, orange, and red carotenoids have an industrial use in food products and cosmetics as vitamin supplements and health food products and as feed additives for poultry, livestock, fish, and crustaceans. The growing worldwide market value of carotenoids is projected to reach over US$1,000 million by the end of the decade. The nutraceutical boom has also integrated carotenoids mainly on the claim of their proven antioxidant properties. Recently established benefits in human health open new uses for some carotenoids, especially lutein, an effective agent for the prevention and treatment of a variety of degenerative diseases. Consumers' demand for natural products favors development of pigments from biological sources, thus increasing opportunities for microalgae. The biotechnology of microalgae has gained considerable progress and relevance in recent decades, with carotenoid production representing one of its most successful domains. In this paper, we review the most relevant features of microalgal biotechnology related to the production of different carotenoids outdoors, with a main focus on β-carotene from Dunaliella, astaxanthin from Haematococcus, and lutein from chlorophycean strains. We compare the current state of the corresponding production technologies, based on either open-pond systems or closed photobioreactors. The potential of scientific and technological advances for improvements in yield and reduction in production costs for carotenoids from microalgae is also discussed.
(Instituto de Bioquímica Vegetal y Fotosíntesis, Universidad de Sevilla-Consejo Superior de Investigaciones Científicas, Avda. Américo Vespucio 49, Sevilla, 41092, Spain; email of Miguel G. Guerrero: mgguerrero@us.es)

INVESTIGATION ON FECUNDITY, FOLLICLES AND FREE EMBRYO SIZE OF POND-REARED PIKE (ESOX LUCIUS) OF DIFFERENT AGE AND SIZE
Tania Hubenova, Angel Zaikov, Penka Vasileva-2007
Aquaculture International 15(3-4): 235-240
Abstract:
The purpose of the present study is to investigate the gonadosomatic index (GSI %), the absolute and relative fecundity of one-year-old pike weighing over 400 g and at the same time to study the dependence between the egg size and the size, behavior and vitality of the free embryos obtained from one- and two-year-old spawners. The study involved two weight groups of females, differing in age and body weight and length—one-year-old (W = 514 g, SL = 36.1 cm) and two-year-old matured pike (W = 1454 g, SL = 49.3 cm). Ovary samples were fixed and egg follicles containing maturing oocytes counted and weight. The weight and length of the free embryos from semi-artificial spawning were measured. The results showed that, when raising this species under farmed conditions, more than 40% (in rarer cases 90%) of one-year-old pike females reached over 400 g and 35 cm (SL) and reached puberty. Absolute fecundity of 15,030 follicles (30 follicles per gram body weight) was observed; the GSI was nearly 15% and the follicle weight reached 3.7 mg. This data differs significantly from that obtained from the larger two-year-old fishes: absolute fecundity 41,363 follicles (28 follicles per gram body weight), GSI nearly 20%, follicle weight 5.8 mg. Results showed that the different follicle size determines the free-embryo size. A positive linear correlation was found between the egg follicle weight and the free-embryos weight (r = 0.7143). The free embryos obtain from the one- and two-

year-old spawners differed significantly both in terms of their weight (7.13 mg against 10.61 mg) and total length (0.81 cm against 0.97 cm), the differences being 1.5- and 1.2-fold, respectively.
(Institute of Fisheries and Aquaculture, Varna, Freshwater Fisheries Branch, 248 Vasil Levski Str., Plovdiv, 4003, Plovdiv, Bulgaria; email of Tania Hubenova: thubenova@yahoo.com)

MANAGEMENT OF PADDLEFISH FRY AND JUVENILES IN BULGARIAN CONDITIONS
Tania Hubenova, Angel Zaikov, Penka Vasileva-2007
Journal Aquaculture International 15(3-4): 249-253
Abstract:
When paddlefish larvae were reared in tanks and fed on zooplankton, a length of 12–15 cm and a weight of 9.2 g had been obtained by the second month after hatching. After a further 2-months of pond rearing, the survival rate was 48%, and the juveniles had reached an average weight of 27.74 g and length of 22.5 cm. Much better growth rate was achieved when both paddlefish fry and juveniles were reared only on artificial food in tanks. At the end of the first month, a weight of 11.6 g had been reached; at the second month the paddlefish weight was 33.29 g, at the third month it was 60.2 g, and at the fourth month it was 127.7 g. There were two cases in which, respectively, 1,000 and 1,500 paddlefish with an average body weight of 33–60 g were stocked in a reservoir. At the age 5 months the fish had reached, or exceeded, an average weight of 500 g, and, after 1 year, it was over 700 g, which is an indicator of the good rearing opportunities this reservoir offered.
(Institute of Fisheries and Aquaculture, Varna, Freshwater Fisheries Branch, 248 Vasil Levski Str.,, Plovdiv, 4003, Bulgaria; email of Tania Hubenova: thubenova@yahoo.com)

SUCCESS OF NURSING IDE (LEUCISCUS IDUS, L.) FRY RELATED TO THE PERIOD OF FEEDING WITH LIVE FOOD
Jitka Hamáčkova, Andrea Lepičová, Miroslav Prokeš, Pavel Lepič, Pavel Kozák, Tomáš Policar, Leon Andrzej Stanny-2007
Journal Aquaculture International 15(3-4): 255-265
Abstract:
The ide Leuciscus idus (Linnaeus 1758) belongs to autochthonous, less frequent and vulnerable fish species in the frame of ichthyofauna of the Czech Republic. It was the reason for testing the possibility of captive breeding and production of fry in a controlled environment. The goal of this paper was to find the optimal transfer time of ide larvae from live food (Artemia salina nauplii) to dry starter feed providing good survival and growth. At the end of the experiment, high values of cumulative survival (in percentages) and individual weight (in milligrammes) were found for ide fry in groups D (90.6%, 178.6 mg; 15 days A. salina + 10 days starter feed), A (89.9%, 169.9 mg; A. salina only) and C (88.6%, 160.4 mg; 10 days A. salina + 15 days starter feed). Significantly lower values of the given parameters were found in group B (57.1%, 92.6 mg; 5 days A. salina + 20 days starter feed), and the lowest ones were in group E (29.8%, 75.6 mg; starter feed only). Mean values of the level of ontogenesis at the end of the experiment in fry of A–E groups were analogous to length and weight growth. Groups D, C and A consisted of juveniles only (J1, J2), and groups B and E consisted of larvae and juveniles (L4, L5, L6, J1, J2). Condition and production parameters [Fulton's coefficient of condition (FWC), total length (TL), weight (w), specific growth rate (SGR), food conversion ratio (FCR), cumulative survival] and relationships between basic lengths TL, fork length (FL) and standard length (SL) were evaluated.
(Research Institute of Fish Culture and Hydrobiology of Vodňany, University of South Bohemia České Budějovice, Zátiší 728/II, Vodnany, 389 25, Czech Republic; email of Jitka Hamáčková: hamackova@vurh.jcu.cz)

IMPORTANCE OF FATTY ACIDS IN BROODSTOCK DIETS WITH EMPHASIS ON ARCTIC CHAR (SALVELINUS ALPINUS) EGGS
Jana Pickova , Eva Brännäs, Torleif Andersson-2007

Journal Aquaculture International 15(3-4): 305-311
Abstract:
The importance of long-chain polyunsaturated fatty acids, especially the eicosanoid precursors, is addressed in this paper. It has been generally recognized that eicosapentaenoic (EPA, 20:5n-3) and docosahexaenoic acid (DHA, 22:6n-3) are of significant importance in fish reproduction while arachidonic acid (AA, 20:4n-6) has often been overlooked. The ratio between C20 fatty acids EPA and AA might be important for many physiological functions depending on the species evolution and its requirements. Arctic char (Salvelinus alpinus) has a much more pronounced freshwater history and therefore different fatty acid requirements than the other commonly farmed salmonids such as salmon (Salmo salar), brown trout (Salmo trutta) and rainbow trout (Oncorhynchus mykiss). Therefore there is reason to formulate a feed that is more suitable for farming of this freshwater species. In this study, freshwater wild-origin char eggs were compared to farmed eggs of char. The ratio n-3/n-6 of total phospholipids of eggs was much lower in the wild fish, 3.5 versus 13.5, and the hatching rate of eggs from natural environment was much higher (20–70% vs. >80%). We conclude that feed based on marine raw product does not fulfill the requirements for essential fatty acids for freshwater char and we suggest that AA is supplemented to the broodstock diet and that at least linoleic acid (18:2n-6) is included in the on-growth diet formulas to lower the n-3/n-6 fatty acid ratio.
Keywords Gamete - Lipid composition - Nutrition - Reproduction - Salvelinus alpinus
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GENETICS OF THE RESISTANCE TO HYPOXIA IN POSTLARVAE AND JUVENILES OF THE PACIFIC WHITE SHRIMP PENAEUS (LITOPENAEUS) VANNAMEI (BOONE 1931)
Ana M. Ibarra, Carlos I. Pérez-Rostro, José L. Ramírez, Ernesto Ortega-Estrada-2007
Aquaculture Research 38 (8): 838–846.
Abstract:
The genetics of resistance to hypoxia was studied in shrimp using two approaches, heritability estimation and heterosis estimation. The heritability of resistance to hypoxia was evaluated in two populations of shrimp postlarvae families produced at different times, and heterosis was estimated through the reciprocal crosses of two genetically distinct shrimp populations at postlarvae and juvenile. Heritabilities of resistance to hypoxia in postlarvae were large and out of the range for the heritability (1.73±0.09, 1.35±0.14) regardless of population evaluated. When covariates (survival and mean total weight to postlarvae 15 days old) were introduced in the analyses to correct for effects during rearing of the larvae, the heritabilities did not change substantially for the first population, but were decreased for the second population depending on the covariate used for correction (1.15±0.10 and 1.08±0.11 for the covariates survival and total weight respectively). Those large heritabilities could be explained by the presence of confounded common environmental variance in the estimated genetic variance (maternal effects), or by dominance and epistatic effects being an important part of the estimated genetic variance. Heterosis analyses dissecting maternal effect indicated that both effects, maternal and dominance, are involved in the resistance to hypoxia at postlarvae, and that although maternal effects decreased at juvenile stage, the trait was still characterized by presenting a large heterosis value (62–65% for postlarvae and 36% for juveniles).
(Aquacultural Genetics Laboratory, Centro de Investigaciones Biológicas del Noroeste (CIBNOR S.C.), Mar Bermejo 195, Col. Playa Palo de Sta. Rita, A.P. 128, La Paz, BCS, México 23090; email of A. Ibarra: aibarra@cibnor.mx)

EFFECT OF HYPO- AND HYPERSALINE CONDITIONS ON OSMOLALITY AND NA+/K+-ATPASE ACTIVITY IN JUVENILE SHRIMP (LITOPENAEUS VANNAMEI) FED LOW- AND HIGH-HUFA DIETS
M.A. Hurtado, I.S. Racotta, R. Civera, L. Ibarra, M. Hernández-Rodríguez, E. Palacios-2007
Comparative Biochemistry and Physiology - Part A: Molecular & Integrative Physiology 147(3): 703-710

Abstract:
Fatty acid composition of cellular membranes can modify permeability and can modulate the activity of Na+/K+-ATPase. Although highly unsaturated fatty acids (HUFA) improve survival and osmoregulatory capacity to low salinities in penaeid shrimp, the possible mechanisms have not been established. For this purpose the influence of HUFA supplementation in diet (2.9 vs. 34% HUFA proportion to total fatty acids) on osmoregulatory responses of juvenile Litopenaeus vannamei submitted to an acute (15 h) or chronic exposure (21 days), to low (5 g L− 1) and high salinities (50 g L− 1) was analyzed. Shrimp fed the high-HUFA diet, had higher concentration of main HUFA (20:5n − 3 and 22:6n − 3) in polar lipids of gills. Osmotic pressure in hemolymph was significantly affected by salinity in acute (640, 751, 847 mOsm/kg for 5, 30 and 50 g L− 1, respectively), and chronic exposure (645, 713, 814 mOsm/kg), but variations between them were small compared to environmental salinity (206, 832, 1547 mOsm/kg), indicating that osmoregulation was achieved in a matter of hours. An increase in Na+/K+-ATPase activity was observed only after a chronic exposure to low salinity. Free amino acids (FAA), mainly alanine and arginine, were higher at 30 (control) and 50 g L− 1 in accordance to their role as organic osmolites. Neither osmotic pressure, Na+/K+-ATPase activity, nor FAA was affected by HUFA supplementation. However, higher water content in gills of shrimp exposed to low salinities was counteracted by increased HUFA content, which could be a result of changes in water permeability of gills. The osmoregulatory capacity of penaeid shrimp to low and high salinities was achieved within 15 h of acclimation and did not depend on HUFA supplementation in the diet.
(Centro de Investigaciones Biológicas del Noroeste (CIBNOR), Mar Bermejo 195, Col. Playa Palo de Santa Rita, La Paz, B.C.S. 23090, México; email of E. Palacios: epalacio@cibnor.mx)

BIOTECHNOLOGICAL APPROACH TO PRODUCE CHITIN AND CHITOSAN FROM THE SHELLS OF ARTEMIA URMIANA GÜNTHER, 1899 (BRANCHIOPODA, ANOSTRACA) CYSTS FROM URMIA LAKE, IRAN

Asadpour,Yosefali; Motallebi, Abbasali; Eimanifar, Amin-2007
Crustaceana, Volume 80(2): 171-180
Abstract:
Chitin and chitosan are both natural biopolymers that can be extracted from the shells (exoskeletons) of a variety of crustaceans. The objective of the present study was to characterize the chitin and chitosan obtained from the shells of Artemia urmiana cysts and to compare these to two commercially available products purified by chemical and biological methods. The shells of Artemia cysts were obtained from Urmia Lake, Iran. We found a high yield of chitin in comparison to other sources, with a lower percentage of residual materials. We also found the efficiency of conversion of chitin to chitosan to be 20 ± 10% using the biological method described herein. The high molecular weight, crystalinity, and lower degree of deacetylation (D.D.A.) of these biopolymers obtained by the biological method were other characteristics associated with the use of Artemia urmiana cyst shells as the source. The results of analytical methods indicate that both chitin and chitosan from empty Artemia cysts compared favourably with two commercially available products. In conclusion, we suggest that one should consider using the biotechnological approach taken here, instead of resorting to commonly used chemical methods, in order to reduce environmental pollution but still obtain high quality products.
(Iranian Artemia Reference Center, P.O. Box 368, Urmia, Iran)

TRYPSIN ENZYME ACTIVITY DURING LARVAL DEVELOPMENT OF PENAEUS SEMISULCATUS DE HAAN, 1844, FED ON LIVE FEEDS

Turkmen, Gurel; Baysal, Senay H.-2007
Crustaceana 80(2): 225-234
Abstract:
The growth, survival, and trypsin activity response of Penaeus semisulcatus larvae was examined with two different live feed regimes throughout larval development under laboratory conditions. In the first

feeding regime, larvae were fed standard live diets of mixed microalgae from the first to the third protozoea (PZ1 to PZ3), followed by Artemia nauplii until postlarva 1 (PL1). In the second feeding regime, larvae were fed a diet of Artemia nauplii at the beginning of the PZ2 stage. Like other penaeids, P. semisulcatus larvae showed high trypsin activity during the late protozoeal or early mysis stages, which decreased during subsequent stages when fed on conventional live diets of microalgae followed by Artemia nauplii during the mysis stages. P. semisulcatus larvae fed Artemia nauplii from PZ2 onward were significantly heavier on reaching M1 than those fed microalgae ($P < 0.05$). In contrast, the survival rate of larvae fed with the first feeding regime was higher than that of those in the second feeding regime ($P < 0.05$). The trypsin activity level in stages PZ2, PZ3, M1, and M2 fed Artemia nauplii was significantly lower than that in the same stages fed microalgae ($P < 0.05$).
(Faculty of Fisheries, Ege University, TR-35100 Bornova-İzmir, Turkey)

A REVIEW OF DIGESTIVE ENZYME ACTIVITY IN PENAEID SHRIMPS
Carrillo-Farnés, Olimpia; Forrellat-Barrios, Alina; Guerrero-Galván, Saúl; Vega-Villasante, Fernando-20007
Crustaceana, 80(3): 257-275
Abstract:
The purpose of this article is to present an overview of the digestive enzymes of penaeid shrimp. The review also covers the effects of circadian rhythms and variations according to moulting cycles on the activities of the various digestive enzymes.
(Departamento de Bioquímica, Facultad de Biología, Universidad de La Habana, Calle 25 entre J e I, Vedado, Cd. Habana, Cuba)

LARVAL DEVELOPMENT OF PAGURUS SIMULANS (DECAPODA, ANOMURA, PAGURIDAE) REARED IN THE LABORATORY
Kim, Mi Hyang; Hong, Sung Yun; Son, Min Ho; Huh, Sung-Hoi-2007
Crustaceana, 80(3):327-343
Abstract:
The complete larval development of Pagurus simulans is described, based on laboratory rearing. The species has four zoeal stages and a megalopa. The larvae are described and illustrated, and detailed comparisons are made with other closely related species. Adults of P. simulans have been confused with those of P. brachiomastus and P. proximus. However, the larvae of P. simulans show morphological differences with those of similar species in the shape of the telson process and in the setal formulae of the appendages.
(Korea Inter-University Institute of Ocean Science, Pukyong National University, Pusan 608-737, Korea)

COMPARISON OF TWO METHODS TO DETERMINE THE MATURITY PERIOD IN PENAEID SHRIMPS (DECAPODA, PENAEIDAE)
Aragón-Noriega, E. Alberto; García-Juárez, Alma R.-2007
Crustaceana, 80(5): 513-521
Abstract:
Most studies of the reproductive period of shrimps are based on the percentage of mature females (PMF). The objective of this work was to determine the reproductive period of penaeid shrimp by applying an egg production index (EPI), combining fecundity, size structure, and density of mature females. We also intended to make a comparison with the PMF method. The months of maximum maturity obtained with PMF did not match those of the actual maximum egg production period. This is because PMF does not take into account the abundance, but rather the proportion of mature females. It is concluded that, in order to define the period of maturity of penaeid shrimp, we need at least three indices (fecundity, size structure, and density of mature females) as proposed here, and as comprised in the EPI.

(Centro de Investigaciones Biológicas del Noroeste, Unidad Sonora, Km 2.35 Camino al Tular, Estero Bacochibampo, Guaymas, Sonora 85454, Mexico)

BIODIVERSITY AND THE FUNCTIONING OF HYPERSALINE LAKE ECOSYSTEMS FROM CRIMEA PENINSULA (BLACK SEA)

Golubkov, Sergey; Kemp, Richard; Golubkov, Mikhail; Balushkina, Evgenia; Litvinchuk, Larisa; Gubelit, Yulia-2007

Fundamental and Applied Limnology / Archiv für Hydrobiologie 169(1): 79-87

Abstract:

Environmental variables, biodiversity-productivity relationships and energy pathways were investigated in six shallow lakes of the Crimea with salinity ranging from 24 to 429 g/l. The research included estimations of primary production and total phosphorus concentrations, evaluation of species composition and abundance of planktonic and benthic organisms. There were considerable inter- and intra-annual fluctuations in the abiotic characteristics of the lakes. All lakes had a very high concentration of total phosphorus in the water (up to 5.6 gP/m3) due to a great influence of the watershed on the lakes. A high level of primary production (up to 14.9 gC m−2d−1) was found in most of the lakes. The lowest primary production was in the most saline lake with a dense population of the filtrator, Artemia sp. There were weak negative relationships between the species richness of phytoplankton and the salinity, but species richness of zooplankton and zoobenthos was strongly negatively related to salt concentration. Positive relationships were found between the total number of planktonic and benthic species and primary production of plankton. Grazing benthic energy pathways were dominant at salinities between 25 and 62.5 g/l. Greater levels of salinity led to the gradual reduction of benthic and to an increase of planktonic energy pathways. There were strong positive relationships between species richness and the primary production of phytoplankton. Three different mechanisms are discussed that provide an explanation for this result. They are energy allocation for osmoregulation at high salinities, complementarity in resource utilization of phytoplankton species and trophic-cascade interactions in ecosystems.
