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**INFORMATION OF INTEREST - JUNE 25, 2007**

9<sup>th</sup> Ecuadorian Congress on Aquaculture CEA & AQUAExpo 2007, Guayaquil, Ecuador October 15-18, 2007

International Council for the Exploration of the Sea ICES – Mariculture Committee

New Zealand Aquaculture Magazine

OPEN AQUACULTURE - “*Producer Associations and their contributions to aquaculture development: the lessons learnt from the FEAP experience*” - A FAO/FEAP Joint Workshop, 24th May 2007 at FAO Headquarters, Rome

Conference documents and presentations

European Society of Micro-Algal Biotechnology - 7th European Workshop  
Potsdam, Germany June 11-13, 2007: book of abstracts

Update on catfish (basa) production in Vietnam:

2006: 700 million US \$ export value, 286,000 tons of basa filets

2007: expected production of 1 million tons, worth 1 billion US \$ export value

Intensification continues to increase (ponds up to 2 m deep) resulting in harvest yields of 400 ton per ha

Fishmeal and Fishoil Outlook for 2007: IFFO commercial committee views (Miami, USA May 9, 2007)

Special issue of Philosophical Transactions of the Royal Society B: Biological Sciences (Volume 362 Number 1483 / July 29, 2007) on communication and quorum sensing in the bacterial world

An FAO manual on installing and operating a bivalve hatchery is now available online.

Produced by the UN Food and Agriculture Organisation (FAO)'s Fisheries and Aquaculture Department, the document provides information on broodstock conditioning, algal culture, hatchery, nursery, grow-out and economic considerations when setting up a hatchery. Based on years of experience, the model is easily adaptable to any region.

This manual includes downloadable detailed technical drawings on hatchery designs.

Click Here for more details

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**A COMPARATIVE SEM MORPHOLOGICAL STUDY ON THE EGG SHELL IN SOME ANOSTRACANS (CRUSTACEA: BRANCHIOPODA) FROM EAST AZERBAIJAN PROVINCE OF IRAN**

L. Mehdizadeh Fanid, M. Seidgar, G. Azari Takami-2007

Iranian Journal of Fisheries Sciences 7(1): 101-110

Abstract:

The surface morphology of resting eggs of Anostracan species from East Azerbaijan Province of Iran and that of *Artemia urmiana* was compared by using Scanning Electron Microscopy (SEM). Anostracan fauna of East Azerbaijan temporary pools were determined as follows:

*Chirocephalus shorikowi* (Chirocephalidae), *Branchinecta orientalis* (Branchinectidae), *Streptocephalus torvicornis* (Streptocephalidae), *Branchinella spinosa* (Thamnocephalidae) and *Artemia urmiana* (Artemiidae). The results suggests the presence of new species from the taxonomical point of view, especially as far as the species of the Streptocephalidae family are considered. However other species may also exist in these pools. Therefore, evaluating the morphology of these cysts by SEM appeared to accentuate that stud of cyst ornamentation is a valuable taxonomical factor and

more importantly that it can be used to identify the species even when the adults are not present at the time of sampling or in the absence of water.

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PROTEIN-SPARING EFFECT OF CARBOHYDRATE IN SILVER BARB, PUNTIUS GONIONOTUS FRY

K.N. Mohanta, S.N. Mohanty, J.K. Jena-2007

Aquaculture Nutrition 13 (4): 311–317.

Abstract:

A 30-day study was undertaken to examine the protein-sparing effect of carbohydrate in diets for silver barb, *Puntius gonionotus* fry. Six semi-purified experimental diets were formulated with two levels of protein (200 and 250 g kg<sup>-1</sup> diet) and three levels of carbohydrate (300, 340 and 380 g kg<sup>-1</sup> diet). In addition to the six experimental diets, a diet containing the protein and carbohydrate requirement levels of 300 and 260 g kg<sup>-1</sup> diet, respectively, as reported earlier for this species, was used as a reference diet. For each dietary treatment, 30 healthy fry of 20 days age ( $0.12 \pm 0.01$  g) were stocked in triplicate tanks using a flow-through system. The fish were fed ad libitum four times a day to a level close to apparent satiation. Batch weighing of fish was done after 15 days of stocking to measure growth and general health status of the fish. The fish fed 250 g protein and 340 g carbohydrate kg<sup>-1</sup> diet with a protein to energy ratio of 17.86 g protein MJ<sup>-1</sup> performed equally well in terms of growth and nutrient utilization as the reference diet group. The study indicates that dietary protein can be reduced from 300 to 250 g kg<sup>-1</sup> diet by increasing carbohydrate from 260 to 340 g kg<sup>-1</sup> diet without sacrificing the growth of silver barb fry.

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DIETARY PROTEIN REQUIREMENT OF JUVENILE MEXICAN SILVERSIDE (*MENIDIA ESTOR* JORDAN 1879), A STOMACHLESS ZOOPLANKTOPHAGOUS FISH

C.A. Martínez-Palacios, M.G. Rios-Duran, L. Ambriz-Cervantes, K.J. Jauncey, L.G. Ross-2007

Aquaculture Nutrition 13 (4): 304–310.

Abstract:

A study was conducted in order to determine the protein requirements of juvenile Mexican silverside (*Menidia estor*). Seven isoenergetic diets ( $\approx 19.9$  MJ kg<sup>-1</sup>) with dietary protein levels of 250, 300, 350, 400, 450, 500 and 550 g kg<sup>-1</sup> were prepared as flakes using jack (*Caranx* sp.) and red snapper (*Lutjanus* sp.) fillets, tuna (*Thunnus* sp.) ovaries and California squid (*Loligo* sp.) as protein sources, and their effects on growth, survival and feed utilization of juvenile *M. estor* ( $69.24 \pm 5.03$  mg initial weight) were evaluated. Fish were fed by hand to apparent satiation, five times a day, for 8 weeks. Best growth and survival were obtained with diets with protein levels between 400 and 500 g kg<sup>-1</sup>, with no significant differences between them ( $P > 0.05$ ). Specific growth rate and feed intake were also highest for these treatments ( $P < 0.05$ ). There were no significant differences in feed conversion ratio and protein efficiency ratio between fish fed all the diets. Broken-line analysis of individual weight gain against protein level showed a protein requirement of 409 g kg<sup>-1</sup> for juveniles of *M. estor*.

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DIETARY CALCIUM REQUIREMENTS OF JUVENILE TILAPIA, *OREOCHROMIS NILOTICUS* × *O. AUREUS*, REARED IN FRESH WATER

S.-Y. Shiau, H.-C. Tseng-2007

Aquaculture Nutrition 13 (4): 298–303.

Abstract:

A feeding experiment was conducted to determine the dietary calcium (Ca) requirement for juvenile hybrid tilapia, *Oreochromis niloticus* × *O. aureus* reared in nature water. Purified diet supplemented with 0, 1, 2, 3, 4, 5, 7 and 10 g Ca kg<sup>-1</sup> diet providing of 0.6, 1.6, 2.6, 3.7, 4.7, 5.5, 7.5 and 10.7 g Ca kg<sup>-1</sup> diet, respectively, were fed to tilapia (mean initial weight: 0.52 ± 0.01 g, n = 3) for 8 weeks. Each diet was fed to three replicate groups of fish in a closed, recirculating fresh water rearing system. The rearing water contained 27.1–33.3 mg L<sup>-1</sup> Ca. The tilapia fed the diets supplemented with ≥3.7 g Ca kg<sup>-1</sup> had significantly (P < 0.05) higher weight gain, when compared with fish fed the diet with ≤1.6 g Ca kg<sup>-1</sup>. Fish fed the unsupplemented control showed significantly lower weight gain when compared with the other groups (P < 0.05). Bone Ca concentration was highest in fish fed the diets with ≥4.7 g Ca kg<sup>-1</sup>, intermediate in fish fed the diet with 2.6 g Ca kg<sup>-1</sup> and lowest in fish fed the control diet. Scale Ca concentration was higher in fish fed the diets with ≥3.7 g Ca kg<sup>-1</sup> than in fish fed the diets with ≤2.6 g Ca kg<sup>-1</sup>. Serum alkaline phosphatase activity was 36% increased in fish fed the diets with ≥2.6 g Ca kg<sup>-1</sup> than fish fed the diets with <1.6 g Ca kg<sup>-1</sup>. Analysis by broken-line regression of weight gain, bone and scale Ca concentrations indicated that the adequate dietary Ca concentration for tilapia in water containing 27.1–33.3 mg Ca L<sup>-1</sup> was 3.5, 4.3 and 4.2 g Ca kg<sup>-1</sup> diet, respectively, supplied as Ca-lactate.

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#### DETERMINATION OF THE THREONINE REQUIREMENT FOR MAINTENANCE IN ATLANTIC SALMON (*SALMO SALAR* L.) FRY WITH THE DIET DILUTION PROCEDURE

T. Abboudi, W. Ooghe, Y. Larondelle, X. Rollin-2007

Aquaculture Nutrition 13 (4) : 281–290.

Summary:

A study was conducted to evaluate the threonine (Thr) requirement for maintenance in Atlantic salmon using the diet dilution procedure (DDP). Fourteen groups of 60 salmon fry [1.46 g initial body weight (BW)] were fed on seven semi-purified diets containing graded levels of N (3–64 g kg<sup>-1</sup> dry matter) and L-Thr (1–39 g kg<sup>-1</sup> dry matter). Seven doses of Thr represented 1–31% of its ideal level for optimum protein deposition. Indispensable amino acids (AA) other than Thr were included in the same proportion as in the Atlantic salmon fry whole-body carcass. Protein deposition and Thr accretion were linear functions of Thr intake. At zero Thr intake fry lost 4.4 mg Thr kg BW<sup>0.75</sup> day<sup>-1</sup> and the Thr requirement for maintenance was 5.8 mg kg BW<sup>0.75</sup> day<sup>-1</sup>, which represented 11% of the total need for Thr. Increasing doses of Thr did not show any effect on AA concentrations in whole-body protein, except for cystine. The linear relationship between Thr gain and Thr intake indicates a constant Thr cumulative efficiency (77%) at marginal Thr intake. Finally, our results suggest that (1) both the DDP and the graded supplementation technique can be used in Atlantic salmon fry for the determination of AA maintenance requirement and utilization efficiency, at least for Thr; (2) the dietary protein level has only a minor effect on the Thr maintenance requirement determination.

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#### OPTIMAL DIETARY CARBOHYDRATE TO LIPID RATIO FOR JUVENILE YELLOWFIN SEABREAM (*SPARUS LATUS*)

Y.-H. Hu, Y.-J. Liu, L.-X. Tian, H.-J. Yang, G.-Y. Liang, W. Gao-2007

Aquaculture Nutrition 13 (4) : 291–297.

Abstract:

A growth experiment was conducted to determine the optimal carbohydrate-to-lipid (CHO: L) ratio for juvenile yellowfin seabream cultured in 340-L indoor recirculating tanks. Seven isonitrogenous (450 g kg<sup>-1</sup> dietary protein) and isoenergetic (14.1 MJ kg<sup>-1</sup>) diets with increasing CHO: L ratios (0.03–5.09 g: g) were fed to triplicate groups of 30 fish with an initial weight of 4.91 g for 56 days. Fish were fed to satiation twice a day and the water temperature ranged between 28 and 31.7 °C during the

experimental period. Survival was high in all the groups and was not affected by dietary treatments. Best weight gain (WG) and specific growth rate (SGR) were observed in fish fed diets with CHO: L ratios of 0.29 and 0.72, which were not significantly different from that of 0.03, 1.26 and 1.92, but apparently higher than that of 3.22 and 5.09. Feed efficiency (FE), protein efficiency ratio (PER) and protein production value (PPV) followed the same general pattern as WG and SGR. Highest level of energy production value (EPV) was found in fish fed diets with CHO: L ratio of 0.72. Proximate compositions of fish whole body and tissues were markedly affected by dietary CHO: L ratios. Whole body, muscle and liver lipid increased as CHO: L ratios decreased, whereas moisture contents were reduced. Dietary CHO: L ratios had no significant effect on protein content in whole body and muscle. Plasma total cholesterol levels of fish fed diets with CHO: L ratios less than 0.72 were significantly higher than those of the other groups. Triacylglyceride levels decreased linearly as dietary CHO: L ratios increased. Viscerosomatic index (VSI) significantly increased as dietary CHO: L ratios decreased. Intraperitoneal fat ratio (IPF) of fish fed diets with CHO: L ratios less than 1.92 were significantly higher than those fed CHO: L ratios of 3.22 and 5.09. Hepatosomatic index (HSI) did not vary between the test diets. Based on second-order polynomial regression analysis of WG against dietary carbohydrate and lipid levels, 84.1 g kg<sup>-1</sup> of carbohydrate and 136.3 g kg<sup>-1</sup> of lipid, corresponding to a CHO: L ratio of 0.62, in a diet holding 450 g kg<sup>-1</sup> of crude protein and 14 KJ g<sup>-1</sup> of metabolizable energy, proved to be optimal for juvenile yellowfin seabream.

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#### THE DIGESTIVE AND METABOLIC ENZYME ACTIVITY PROFILES OF A NONMETAMORPHIC MARINE FISH SPECIES: EFFECTS OF FEED TYPE AND FEEDING LEVEL

Simon Gaston Lamarre, Nathalie Rose Le François, H  l  ne Lemieux, Inger-Britt Falk-Petersen, and Pierre Ulrich Blier-2007

Canadian Journal of Fisheries and Aquatic Sciences 64(6): 849-856

Abstract:

We investigated activity levels of metabolic and digestive enzymes in Atlantic wolffish (*Anarhichas lupus*) and their relationships with growth, ration level, and type of food during the first 50 days after hatch. Newly hatched wolffish were divided among three experimental groups differing in feed and ration (formulated feed in excess (FF), a maintenance ration of *Artemia* (LA), and *Artemia* in excess (EA)) that generated different growth rates. A principal component analysis revealed that activities of the glycolytic enzymes lactate dehydrogenase (LDH) and pyruvate kinase (PK) were associated with mass gain, while those of the aerobic enzymes citrate synthase and aspartate aminotransferase (AAT), and digestive enzymes (lipase and trypsin) were related to time (days) after hatch. Food restriction or food type allowed the observation of a direct relationship between the activities of trypsin and those of associated metabolic enzymes AAT and glutamate dehydrogenase in the LA group (Pearson's R of 0.71 and 0.59, respectively), as well as between the activities of amylase and those of LDH and PK (Pearson's R of 0.62 and 0.48, respectively) in the FF group. The adaptative importance of these patterns during early development of wolffish and their relationship to feeding conditions are examined.

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#### CHANGES IN FATTY ACID COMPOSITION OF MYTILUS GALLOPROVINCIALIS (LMK) FED ON MICROALGAL AND WHEAT GERM DIETS

Maurizio Pirini, Maria P. Manuzzi, Alessandra Pagliarani, Fabiana Trombetti, Anna R. Borgatti, Vittoria Ventrella-2007

Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology 147(4): 616-626

Abstract:

Dietary fatty acid incorporation and changes in various lipid and phospholipid classes in the mussel *Mytilus galloprovincialis* subjected to three different dietary regimens were analysed and compared.

Group A was unfed; group B received a diet consisting of 100% *Thalassiosira weissflogii*, exhibiting the typical fatty acid composition of diatoms, and group C received a diet consisting of 100% wheat germ conferring a 18:2:n-6 abundance. Biochemical analyses of diets and mussels were carried out at the beginning and at the end of the 30-day experimental period. Starvation and *T. weissflogii* based diet poorly affected mussel growth and fatty acid composition which remained unchanged. On the contrary, the wheat germ-based diet increased the condition index and deeply affected the fatty acid profile of all lipid and phospholipid classes. The high dietary 18:2n-6 level drastically reduced tissue content of 20:4n-6, 20:5n-3 and 22:6n-3. The biosynthesis of Non Methylene Interrupted (NMI) dienoic fatty acid appeared to be insensitive to the high input of 16:1n-7 and 18:1n-9 respectively from diet B and C, and to the PUFA shortage of diet C. Nevertheless the two NMI trienoic derivatives, 20:3 $\Delta$ 5,11,14 and 22:3 $\Delta$ 7,13 16, were found higher in C with respect to other groups, presumably due to the high 18:2n-6 content of this diet.

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#### PROTEOLYTIC ACTIVITY AND PROTEASE CLASSES IN THE ZOOPLANKTON SPECIES CALANUS FINMARCHICUS

Geir Solgaard, Inger Beate Standal, Kurt I. Draget-2007

Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology 147(3): 475-481

Abstract:

The temperature optimum for the general proteolytic activity in the crude extract of *Calanus finmarchicus* was 50 °C and the pH optimum was found to be 7. The use of specific protease inhibitors resulted in the identification of at least three protease classes in the crude extract of *C. finmarchicus*. Those classes were serine, metallo and aspartic proteases. The serine and metallo proteases were found to be dominant under neutral to alkaline conditions and the aspartic proteases were dominant under acidic conditions. The cysteine proteases, if at all present, did not seem to be active or present in any substantial amount. The data presented points towards controlling and preserving the protein content in fresh *C. finmarchicus*.

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#### INFLUENCE OF EGG PREDATION AND PHYSICAL DISTURBANCE ON LAKE TROUT SALVELINUS NAMAYCUSH EGG MORTALITY AND IMPLICATIONS FOR LIFE-HISTORY THEORY

J. D. Fitzsimons, J. L. Jonas, R. M. Claramunt, B. Williston, G. Williston, J. E. Marsden, B. J. Ellrott, D. C. Honeyfield-2007

Journal of Fish Biology 71 (1): 1–16.

Abstract:

The influence of egg predators and physical disturbance on lake trout *Salvelinus namaycush* egg mortality was investigated in situ in Lake Michigan where recruitment is below detectable levels and egg predator abundance is high. Comparisons were made with Lake Champlain where recruitment is low and egg predator abundance is also low and with Parry Sound (Lake Huron) where recruitment is moderate and egg predators are in low abundance. A multi-density egg seeding method (100 to 5000 eggs m<sup>2</sup>) was used to quantify the effect of physical disturbance and egg predation on egg loss. Wind fetch was used as an index of physical disturbance and comparisons across all locations and egg densities suggested that at sites with high wind fetch (>5 km), physical disturbance may be a greater source of egg loss than predation. When analyses were limited to those sites having a wind fetch of <5 km, the percentage of eggs recovered was found to be linearly related to predator density. The

strength of this relationship was based largely on egg recovery at 500 and 1000 eggs m<sup>2</sup> because recovery at lower (100, 250 eggs m<sup>2</sup>) and very high (5000 eggs m<sup>2</sup>) densities was not significantly related to predator density. The reason for this is probably that at low egg densities, crayfish *Orconectes* spp., the major egg predator at most sites, had difficulty finding and consuming eggs and at high egg densities they became satiated. Egg loss was directly related to wind fetch for Lake Michigan and on average six-fold greater than for Parry Sound suggesting that without corresponding changes in fecundity and age structure, lake trout populations in large lakes like Lake Michigan are inherently less productive than those from enclosed inland waters.

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#### FATE OF 2 YEAR-OLD, HATCHERY-REARED TROUT COD *MACCULLOCHELLA* *MACQUARIENSIS* (PERCICHTHYIDAE) STOCKED INTO TWO UPLAND RIVERS

B. C. Ebner, J. D. Thiem, M. Lintermans-2007

Journal of Fish Biology 71 (1): 182–199.

Abstract:

Radio-tracking was used in monitoring the reintroduction of on-grown 2 year-old trout cod *Maccullochella macquariensis* (Percichthyidae) (a nationally endangered freshwater fish) in both a large and small upland river. Thirty-six radio-tagged *M. macquariensis* were stocked into a site in each of the Murrumbidgee and Cotter Rivers (Australian Capital Territory). Restricted dispersal occurred in both rivers, with both samples of *M. macquariensis* remaining within 5 km of the release site for the duration of the study. Mortality was rapid and 1 month after release 61 and 31% of the sample was alive in the Murrumbidgee and Cotter Rivers, respectively. In the Murrumbidgee River, complete mortality had occurred 6 months after release. An individual survived in the Cotter River until 7 months after release. Predation by cormorants *Phalacrocorax* spp. and predation or scavenging by the common water rat *Hydromys chrysogaster* were the probable causes of mortality. Predator-assisted movement of radio-tags by cormorants occurred in both groups and had the potential to confound interpretation of active dispersal movements.

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#### FEMALE ARCTIC CHARR DO NOT SHOW APPARENT BENEFITS FROM EXPOSING THEIR EGGS TO SPERM FROM DOMINANT MALES

L. Figenschou, G. Rudolfson, I. Folstad-2007

Journal of Fish Biology 71 (1): 284–289.

Abstract:

To evaluate whether paternal effects occur on offspring traits, eggs from Arctic charr *Salvelinus alpinus* were fertilized with similar amount of sperm from size-matched dominant and subordinate males, in a nested design. Eggs fertilized by subordinate fathers resulted in more offspring produced than eggs fertilized by the same amount of sperm from dominant fathers. Yet, paternal status showed no significant effect on measurements of larvae total length, yolk area and yolk red intensity.

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