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## EFFECT OF DIETARY LIPID LEVEL ON JUVENILE BLACK SEA BASS CENTROPRISTIS STRIATA FED TWO PROTEIN SOURCES

Marty Riche-2008

Fisheries Science 74(5): 1047 – 1054

## Abstract:

A 10-week feeding trial was conducted with juvenile black sea bass *Centropristis striata* fed isonitrogenous diets (46% CP) with four lipid levels (7, 10, 13 and 16%) to identify dietary lipid levels supporting maximum weight gain and efficiency. Menhaden fish meal (FM) and animal protein concentrate (APC) were used in a 2 × 4 factorial experiment to evaluate effects of protein quality and lipid level on production. Weight gain, thermal growth coefficient, protein and energy retention, proximate composition and hepatic indices were evaluated. Weight gain was higher ( $P < 0.05$ ) in FM treatments and no protein sparing effect was observed. All growth, efficiency and retention parameters, except apparent net protein utilization (ANPU) among FM diets, were independent of dietary lipid. Based on proximate composition, diets should be restricted to no more than 13% lipid in a 46% CP diet, and can be reduced to 7% without loss of growth and efficiency. Second order polynomial regressions on ANPU indicated 10–12% dietary lipid in a 46% CP diet is appropriate depending on protein quality. Reducing dietary lipid in current commercial feeds fed to black sea bass could represent a substantial cost savings in feed production.

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## MICROBIAL RISK ASSESSMENT OF LIVESTOCK-INTEGRATED AQUACULTURE AND FISH HANDLING IN VIETNAM

Aya Yajima, Hisashi Kurokura-2008

Fisheries Science 74(5): 1062 – 1068

## Abstract:

Animal manure has been traditionally used to fertilize fish ponds in Vietnam. While this practice effectively reuses agricultural wastes, high concentrations of pathogenic microorganisms in animal manure raise public health concerns. Working in fish ponds and handling of contaminated fish in unhygienic manner were identified as potential factors of occupational risk. *Escherichia coli* occurred in numbers <103 colony forming units (CFU)/100 mL in irrigation water and <104 CFU/100 mL in fish pond water that uses animal manure. *Escherichia coli* on tilapia skin in numbers were <103 CFU/100 cm in excreta-based systems and <101 CFU/100 cm in feed-based systems, respectively. The study identified direct use of animal manure as major contributors of the fecal contamination of pond water as well as skin of cultured fish. Estimated risks of enteric infection were 100–1000 times higher than the US Environmental Protection Agency acceptable risk. While these risk values are not likely to accurately predict infection rates in Vietnam, they indicate a potential occupational risk in the long term. Therefore, a need for risk mitigation measures was realized for health protection of future generation in agricultural communities.

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#### EFFECTS OF CRYOPRESERVATION ON SPERM STRUCTURE IN JAPANESE PEARL OYSTER *Pinctada fucata martensii*

Teruyoshi Narita, Takayuki Kawamoto, Kiyoshi Isowa, Hideo Aoki, Masahiro Hayashi, Hiromi Ohta, Akira Komaru-2008

Fisheries Science 74(5): 1069 – 1074

Abstract:

To clarify factors reducing the motility and fertility of cryopreserved spermatozoa of the Japanese pearl oyster *Pinctada fucata martensii*, the structure of spermatozoa before and after cryopreservation was observed by scanning electron microscopy. Testicular spermatozoa were diluted with cryopreservation diluent (10% methanol + 18% fetal bovine serum + 72% sea water), and dispensed into 0.25-mL straws. The straws were cooled at a rate of approximately  $-20^{\circ}\text{C}/\text{min}$  to  $-50^{\circ}\text{C}$ , and subsequently immersed in liquid nitrogen. Percentage motility of spermatozoa before cryopreservation was  $69.9 \pm 4.2\%$ , and that of cryopreserved spermatozoa was  $24.0 \pm 1.8\%$ , respectively. In cryopreserved spermatozoa, the percentage that lacked or had a deformed flagellum was  $56.6 \pm 3.9\%$ , while in fresh spermatozoa this was  $8.7 \pm 2.0\%$ . In cryopreserved spermatozoa, the percentage of deformed acrosomes was  $76.6 \pm 5.2\%$ , while in fresh spermatozoa this was only  $0.9 \pm 0.3\%$ . Cryopreserved spermatozoa with a normal acrosome and flagellum were only  $15.4 \pm 3.5\%$  of those in fresh spermatozoa. These results indicate that lesion of the flagellum and deformation of the acrosome occurred through the cryopreservation procedure, and both types of damage lead to loss of the motility and fertility in thawed spermatozoa.

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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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#### SIGNIFICANCE OF MN AND FE FOR GROWTH OF COASTAL MARINE DIATOM THALASSIOSIRA WEISSFLOGII

Satomi Ushizaka, Kohji Sugie, Masumi Yasada, Mariko Kasahara, Kenshi Kuma-2008

Fisheries Science 74(5): 1137 – 1145

Abstract:

The significance of Mn and Fe for the growth of a coastal marine diatom *Thalassiosira weissflogii* was investigated by performing culture experiments containing macronutrients with either Mn or Fe, or both. Only the addition of both Mn and Fe induced the highest growth rates and maximal cell yields. Maximal growth was maintained in continuous culture media, which were repeatedly prepared by an inoculation of pre-culture and the addition of both Mn and Fe to the control culture medium containing macronutrients. In particular, it was found that the full growth recovery in Mn-sufficient medium (without added Fe) is accomplished by the addition of Fe even after several days' incubation. On the contrary, there was no sufficient growth recovery by the addition of Mn after a long incubation time in Fe-sufficient medium but without additional Mn. These results suggest that *T. weissflogii* in Mn-sufficient waters retains the ability for full physiological recovery for a long time, probably resulting from the decrease in the oxidative stress of phytoplankton by the production of antioxidant enzyme Mn superoxide dismutase during a long incubation period.

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#### CHANGES IN DIGESTIVE ENZYMES THROUGH DEVELOPMENTAL AND MOLT STAGES IN THE SPINY LOBSTER, PANULIRUS ARGUS

Erick Perera, F.J. Moyano, M. Díaz, R. Perdomo-Morales, V. Montero-Alejo, L. Rodriguez-Viera, E. Alonso, O. Carrillo, G.S. Galich-2008

Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology 151(3): 250-256

Abstract:

Changes in major digestive enzymes through developmental and molt stages were studied for the spiny lobster *Panulirus argus*. There were significant positive relationships between specific activity of trypsin and amylase enzymes and lobster size, whereas esterase and lipase specific activities decreased as lobsters aged. No relationship was found between amylase/trypsin ratio and lobster size. Positive trends were found, however, for trypsin/lipase and amylase/lipase ratios. Results suggest that changes in enzyme activity respond to the lobsters' physiological needs for particular dietary components although multivariate analysis suggested that enzyme activities could be not totally independent of diet. On the other hand, the pattern of changes of major enzyme activities through molt cycle was similar for most enzymes studied. Following molt, trypsin, chymotrypsin, amylase, and lipase activities gradually increased to maximal levels at late intermolt (C4) and premolt (D). There were no variations in the electrophoretic pattern of digestive enzymes through developmental and molt stages and thus, it is demonstrated that regulation is exerted quantitatively rather than qualitatively. Further studies on the effect of other intrinsic and extrinsic factors on digestive enzyme activities are needed to fully understand digestive abilities and regulation mechanisms in spiny lobsters.

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BIOCHEMICAL COMPOSITION AND DIGESTIVE ENZYME ACTIVITIES DURING THE EMBRYONIC DEVELOPMENT OF THE REDCLAW CRAYFISH, *CHERAX QUADRICARINATUS*

Luo, Wen, Zhao, Yun-Long, Yao, Jun-Jie-2008

Crustaceana, 81(8): 897-915

Abstract:

The biochemical composition and the activity of five digestive enzymes of embryos were studied during embryonic development in the redclaw crayfish, *Cherax quadricarinatus* (Von Martens, 1868), in order to investigate the relationship between embryonic development and the utilization of yolk. Carbohydrates remained a minor constituent of the yolk as a whole. The contents of total proteins and total amino acids (TAA) were all observed to decrease. Among the essential amino acids (EAA), the contents of leucine and arginine were relatively high, while of the non-essential amino acids (NEAA), the most important components were glutamine and aspartic acid. The contents of total lipids (TL) decreased during embryonic development, and the predominant fatty acids of both neutral lipids (NL) and polar lipids (PL) were C16:0, C18:0, C18:1 $\omega$ 9, and C18:3 $\omega$ 3. The five digestive enzymes tested all showed changes in their activities. The specific activities of pepsin and trypsin gradually increased in the earlier stages of embryonic development, pepsin decreased rapidly in later stages, while trypsin still kept a high level of activity. The specific activity of amylase changed in a "V" shape and reached high values again in later stages. The specific activities of cellulase and lipase showed relatively low values. It is shown that carbohydrates may play an important role in synthesizing many specific compounds to participate in signal transmission and in forming the carapace. Proteins and lipids were the dominating construction and energy substances; proteins were primarily consumed in the early stages, as against lipids in later stages. Saturated fatty acids (SFA) (16:0 and 18:0) and monounsaturated fatty acids (MUFA) (16:1 $\omega$ 7 and 18:1 $\omega$ 9) were always used for energetic purposes and polyunsaturated fatty acids (PUFA) (20:5 $\omega$ 3 and 22:6 $\omega$ 3) were important as structural components of cell membranes and in the development of the central nervous system. The activities of the digestive enzymes were controlled by their genes and expressed sequentially during embryonic development. They hydrolyse the yolk and provide construction substances and energy sources for the formation of tissues, organs, and various systems in general.

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FISHERIES AND AQUACULTURE IMPLICATIONS OF A MERISTIC CHARACTER IN WILD POSTLARVAE OF THE SHRIMP, *LITOPENAEUS VANNAMEI* (BOONE, 1931) (DECAPODA, PENAEOIDEA)

Cabrera-Jiménez, Jorge A., Soto, Luis A.-2008

Crustaceana, 81(8): 993-998

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SEVERE MORTALITY IN MESOCOSM-REARED SHARPSNOUT SEA BREAM *DIPLodus PUNTAZZO* LARVAE DUE TO EPITHELIOCYSTIS INFECTION

Pantelis Katharios, Maria Papadaki, Nikos Papandroulakis, Pascal Divanach-2008

Diseases of Aquatic Organisms 82(1):55-60

Abstract:

This paper describes severe mortalities recorded in sharpsnout sea bream *Diplodus puntazzo* larvae reared in mesocosms. The mortalities were attributed to epitheliocystis infection. The pathology associated with the disease is described using histological techniques. Microscopical examination showed a massive infection of the skin, fins, and oral cavity, with impaired feeding, respiration, and

osmoregulation being the most likely cause of death. This is the first report of epitheliocystis disease in sharpsnout sea bream and in fish at such an early developmental stage.  
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