FISH LARVAE QUALITY DESCRIPTORS: AN APPRAISAL OF METHODS FOR RED PORGY *Pagrus pagrus* AND GROUPER *Epinephelus marginatus* PRODUCED UNDER DIFFERENT REARING CONDITIONS

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Quality control in fish hatcheries is of paramount importance to achieve the desired characteristics of larvae and fry, either for the market or release to the wild. Quality programmes are applied in a day to day basis having direct implications for production management and final costs of product. Most common criteria used for larval quality assessment are morphometrics, condition factor, histometrical indices, lipid analysis, nucleic acid ratios, enzyme activity and stress tests.

Red porgy (*Pagrus pagrus*) and dusky grouper (*Epinephelus marginatus*) are two species of high commercial value throughout their distribution areas and candidate species for aquaculture diversification or restocking programmes. Larval rearing is presently made either in mesocosm or more intensive rearing conditions, but the production is limited by the lack of knowledge of the species nutritional requirements. Red porgy and dusky grouper larvae populations in culture are characterized by high size heterogeneity, leading to difficulties for effective feeding and ultimately, resulting in high cannibalism. Furthermore, the allometric growth of the larvae, particularly their mouth gape related to body height, facilitates the engulfing of conspecific prey. Larval deformities, common in the 2 larval species, are also a consequence of nutritional deficiencies or inadequate rearing conditions.

Recent works with red porgy larvae reared under laboratory conditions revealed that other criteria besides morphometrics are the most sensitive and reliable indicators of the larvae nutritional status. These include digestive enzymes and selected fatty acids as well. Combining the different approaches to monitor larval development and size, plus their nutritional status it is feasible to establish quality criteria that will contribute to improve red porgy and dusky grouper larval performance and avoid cannibalism.

EFFECTS OF PHYLLOQUINONE ON *Solea senegalensis* SKELETOGENESIS

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Skeletogenesis is a continuous process occurring during fish larval development that is influenced by vitamin K VK, an essential factor for the correct formation of coagulation factors and skeletal matrix proteins. High levels of skeletal deformities are recorded in most commonly cultured species like the sparids, sea bass and flatfish like the Senegalese sole. The appearance of malformations takes place during the larval stages, when skeletal structures are forming. Several factors have been pointed as possible causes for the appearance of skeletal deformities, namely poor environmental conditions such as industrial water pollution and high levels of various organic metabolites (like ammonia), water currents, temperature, genetic and different nutritional factors. The effects of phylloquinone (VK1) on Senegalese sole skeletal development was evaluated in larvae reared under tree different dietary regimes supplemented in graded levels of VK1 (0, 50 mg/kg, 250 mg/kg) using Artemia as vehicle. The effects of increasing dietary VK1 levels were evaluated in larval performance: mineral content, larval growth and incidence of skeletal deformities. Our results show a significant reduction in the levels of deformities in Senegal sole larvae reared with vitamin K supplemented diet.

Material and Methods - *S. senegalensis* eggs were obtained by natural spawning of broodstocks, that were maintained under natural photoperiod and temperature conditions. Eggs were incubated at 19ªC and hatched larvae separated into 3 groups in triplicates and transferred to 70 liter cylindroconical tanks at a density of 60 larva / liter. Larvae were fed rotifers and artemia enriched with Super Selco supplemented with 0, 50 and 250 mg/kg phylloquinone. At 19 days after hatching (dah) larvae were transferred to flat bottom tanks and reared on enriched artemia until 40 DAH. Samples were collected for preparing ashes and quantifying Calcium and phosphate levels; for skeletal double staining of the skeleton and for HPLC analysis.

Results and Discussion - We have achieved an efficient delivery of VK1 with levels increasing on fish larvae fed VK1 diets. No differences were observed on larval growth and survival at the end of the experimental period. Larvae from 50 and 250 mg VK1 show an increase in mineral content. A significant reduction on the incidence of deformities was achieved when comparing larvae supplemented with 250 mg of VK1 and control larvae. This work shows a clear benefit on vitamin K supplementation, by increasing larval skeletal quality.

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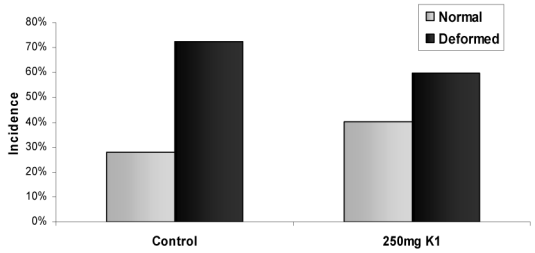

Figure 1- Evaluation of incidence skeletal deformities in phylloquinone supplemented larvae.