DIVERSIFY: RESULTS FROM THE FIRST YEAR OF WRECKFISH (*Polyprion americanus*) CULTURE

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Introduction

Wreckfish is one of the most interesting new species for aquaculture, due to its fast growth, high market price and limited fisheries landings and easy of manipulation in captivity (Papandroulakis et al., 2008). A recent study on wild-caught individuals was shown that fish grew from 1 kg to 5 kg in 10 months (Peleteiro et al., 2010). This species presents late reproductive maturation (Sedberry et al., 1999). The lack of reproduction control and of established larval rearing protocols are considered as the major bottlenecks preventing wreckfish aquaculture. Limited egg collection has been achieved from captive spawners using hormonal induction (Papandroulakis et al., 2008) or stripping of naturally maturing fish (Peleteiro et al., 2011). Embryonic development and the early life stages have been described (Papandroulakis et al., 2008, Peleteiro et al., 2011).

Material and methods

Due to the low wreckfish specimens available, all EU broodstocks were used in order to study reproductive cycle in captivity. Animals are from the Hellenic Center for Marine Research (CMR: n=5), Instituto Español de Oceanografía (IEO: n=10), Aquarium Finisterrae (MC2: n=24) and Conselleria do Medio Rural e Mariño (CMRM: n=10), totaling 20 females, 20 males and 8 undetermined. Three from the four stocks are under natural temperature and photoperiod conditions, while the MC2 stock has an artificial photoperiod, and three different diets provided to the animals. Natural spawns (collected from the tanks) and "in vitro" fertilization (eggs and sperm obtained by abdominal massage) were obtained from the MC2 stock. The HCMR was induced with GnRH implants (400 µg y 750 µg) and small spawns with low quality (<1% fertilization) were obtained. The IEO and CMRM stock were controlled on a monthly basis; blood samples were extracted from the brachial arch to determine sexual steroids. Sperm was obtained from specimens from the HCMR and IEO through abdominal massage. Sperm collected was used to determine motility, density, speed and trajectory using traditional counting methods (Thoma plaque) and computer assisted sperm analysis (CASA). Fertilized eggs from the MC2 stock were incubated, and larvae cultivated until 20 days old, using the traditional "green water technique" with phytoplankton and rotifers (*Brachionus plicatilis*). Additionally, periodical sampling was performed at the Vigo fish marked, of wreckfish captured from the Azores fisheries, in order to study the reproductive cycle. A total of 68 wild caught fish were sampled. Data on morphometric measurements and gonad maturation (histology) were collected. Also, viscera were collected for biochemical composition (fatty acids, proteins and lipids).

Results and conclusions

Reproduction and genetics: Blood samples were collected to describe the reproductive cycle from two stocks (IEO and CMRM). Initial results indicated that captive wreckfish produced sufficient sperm over a long reproductive season, and that females can complete vitellogenesis. However, two problems were encountered: many breeders did not mature and wild mature fish were prohibitively expensive. In order to increase the number of fish sampled in future years, breeders from more broodstocks will be sampled. Also, large mature wild fish sampling will be performed. The description of gonad aspect and structure was performed ion animals ranging from 3 to 18 KG, and between 55 and 85 cm in mantle length.

Development of spawning induction procedures was initiated for three different broodstocks. Fish spawned spontaneously, were induced to spawn (HCMR) using 400µg and 750 µg GnRH implants, and eggs were stripped for in vitro fertilisation. However, few fertilised eggs were produced and no eggs were provided for larval culture studies. These preliminary results indicate how the work should progress to ensure fertilised eggs are obtained, with a focus on in vitro fertilisation.

Evaluation of sperm characteristics and cryopreservation protocols was initiated with the first characterisation of wreckfish sperm. The sperm had the highest reported velocity for a marine fish and duration of motility of 5 min. This work will be completed with more sperm sampling. Altogether, the advances in all tasks in the work package represent a start that can be used to ensure the desired advances and deliverables in the coming years.

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2. Nutrition: studies on wild wreckfish composition, bibliography collection of feeding regimes in the wild and about the feeding of wreckfish broodstock were conducted to allow the development of a specific formulation of the broodstock diets. Fish dissection and sample collection of muscle, liver and gonads were carried out for biochemical analysis to know the nutritional status of wild fish. The stomach content was also observed. The results (% DW) showed that on wild wreckfish,, the level of proteins and lipids in muscle varied between 70-95% and 3-14% respectively. In liver and gonad a high variability was observed.This study provides information about the muscle, liver and gonad composition of wreckfish showing that wild wreckfish meat have a high amount of proteins (86%) and a low lipid content (6%). Furthermore they had DHA+EPA amounting to around 30% of the total fatty acids , with a particularly high proportion of DHA (26%). The information collected at a bibliographic and biochemical level allowed the development of a new specific formulation for wreckfish broodstock that is being tested comparing with semi-moist diet in two different batches of IEO broodstock.

3. Larval Husbandry: egg were obtained after spontaneous spawning of the broodstock from MC2. Nevertheless, hatching success and larval quality was very poor compared to the previous year, possibly due to extremely variable and changing weather conditions, which was the only changing variable. From all the spawns, only one had acceptable quality to attempt further larval culture (Fertilization: 70%, number eggs 270.000, egg diameter 2,405±32 µm and Number of eggs/ml: 270±112).

Once egg incubation was concluded (hatching percentage: 14%), the resulting 11,340 larvae (3.8 ± 0.3 mm) with 100% yolk sac were transferred to a 85-l culture tank. The yolk sac was consumed in 6 days post hatching (dph); mortality was 100% at 20 dph. Rotifers (*Brachionus plicatilis*), at a concentration of 8 rot/ml and phytoplankton were used as diet, but at no time ingestion of live feed was observed. Larvae at 20 dah had a functional digestive system, but all had empty stomachs.

References

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