

**THE MANIPULATION OF MATURATION TIMING IN SABLEFISH
BROODSTOCK USING MODIFIED PHOTOPERIOD REGIMES**

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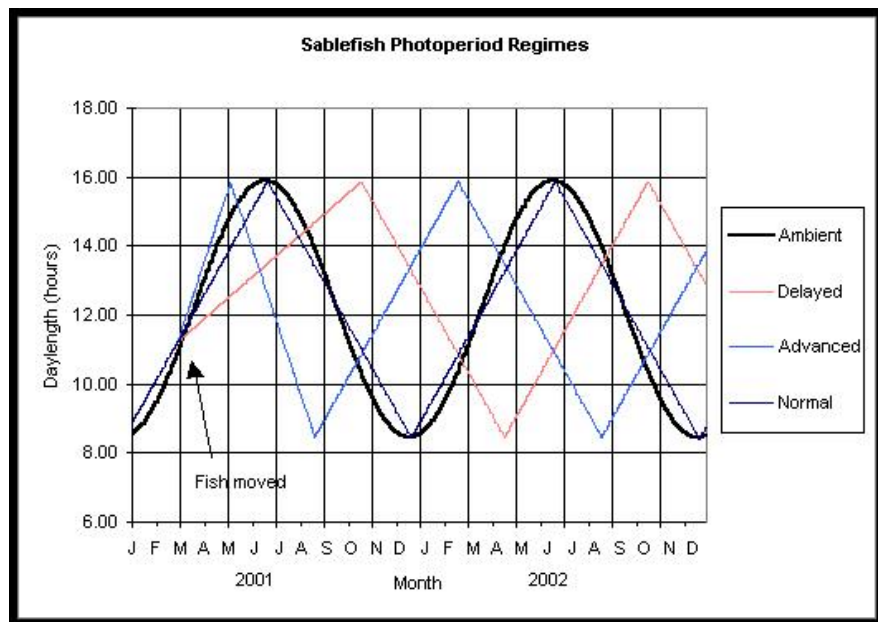
EXTENDED ABSTRACT ONLY - DO NOT CITE

The sablefish (*Anoplopoma fimbria*) has been identified as a priority species for aquaculture in the Pacific Northwest due to its declining commercial and recreational fisheries, its high value, as well as its recognized potential for adapting well to captive aquaculture. In the wild, sablefish adults spawn in mid February at a temperature range of 4 - 6 °C, and approximately 700m depth. Prior research has indicated that holding captive broodstock in chilled sea water 6 - 7.5 °C improves the quality of gametes obtained from sablefish. The present study uses a chilled (constant 6 °C) recirculating seawater system coupled with computer controlled photoperiods to alter the timing of maturation in wild caught sablefish broodstock. Artificial control of maturation in this species will provide year-round production of gametes enabling the rapid development of techniques to optimize broodstock and larval rearing, which are typical bottlenecks to aquaculture.

Ninety six wild caught adult sablefish (of mixed sex), previously maintained in a single pass, shore based pumped seawater system (temperature range 8°C - 13°C) for over a year, were moved in March 2001 to a 15,000 gallon closed recirculating seawater system held at 6°C. The fish were distributed between three different photoperiod regimes designed to advance maturation by 4 months (n=21), delay by 4 months (n=21) or mimic the normal spawning time (n=56)

(Fig 1.). All fish were pit tagged so growth rate and response to the environmental conditioning could be monitored for each individual. Where possible fish maturity status and sex was determined by gonad biopsy, however, not all fish provided an adequate biopsy for such analysis. Fish were fed to satiation once per week (approximately 0.74% body weight on a wet weight basis).

Fig 1. Advanced, normal and delayed photoperiod regimes



Of the fish in the advanced group, 48% were identified as having maturing eggs in October-November, however only 10% of these proceeded to grow their oocytes to a size suitable for induced final maturation (1.1mm diameter) in December and January. The remaining fish reabsorbed their eggs; these fish remain on a phase shifted photoperiod and are expected to mature in fall 2002.

Of the fish in the normal photoperiod (synchronous with the ambient photoperiod), 72% of known females (from biopsies) reached an oocyte size suitable for implantation between February and May 2002. We have not detected any females in the normal photoperiod that have initiated oocyte development and subsequently reabsorbed oocytes prior to reaching a size suitable for spawning induction. The remaining 27% of females which have failed to mature in this cycle are expected to mature in the following cycle (Spring 2003). Several females in this group were lost due to a mechanical failure.

Fish in the delayed photoperiod group are expected to mature and spawn in June – July 2002. Identification of fish with developing oocytes in this group has not been completed at the time of abstract submission, but will be discussed in the poster.

Overall mortality to date has been 16%. All post spawned females have died within approximately a week after final egg stripping. Also, several implanted females have shown incomplete oocyte hydration and have died prior to releasing all of the mature oocytes in their ovaries. Mature females have, at this point, contributed 44% to the overall mortality rate.

Final maturation and hydration has been induced successfully with LHRHa (D-Ala⁶,Des-Gly¹⁰Pro⁹-LHRH, ethylamide), delivered by 95% cholesterol made at our lab. Two females have ovulated successfully without LHRHa implants, delivering a total of 265,000 eggs. Total egg take has reached 2.25 million eggs from 9 females, with an average of 250,000 eggs (approximately 160 eggs/ml). Eggs stripped per batch range from 16,000 - 289,000. The maximum egg take from a single female over time has been 535,000 eggs. Fertilization rates have ranged from 0-87%. This data shows that production can reach 465,000 fertilized eggs from a single female broodstock in this type of recirculating aquaculture system.

Initial results using LHRHa to induce spermiation in males does not appear to pose a problem, although sperm quality has not yet been investigated. While incubation to hatch has been achieved in initial trials, the construction of egg incubation facilities in our laboratory is not yet complete. Therefore, hatching rate and post-hatch survival have not been investigated. Incubation systems, however, are currently being developed for larval production.

Our results indicate that it is possible to use intensive state-of-the-art recirculation systems and photoperiod control to produce maturing male and female sablefish. Thus, the production of larvae may be possible, for supplying to researchers, and eventually commercial production systems on a year-round basis.

This study was sponsored by NOAA, under the National Marine Aquaculture Initiative.