

Ovaplant in Halibut

Introduction

Atlantic halibut, *Hippoglossus hippoglossus*, females will produce ova in serial ovulations that extend through the spawning season of February to the end of May. However, males in captivity will produce milt in adequate quantities for a limited time only. When artificial spawning is done in the mid- to late-season, it is not an isolated occurrence to have ova available and insufficient milt volumes to fertilize the eggs. This can place serious restrictions on production of juveniles for production and research. The challenge to the industry is to increase the amount of milt that is available late in the spawning season.

The direct solution to milt availability would be to hold many adult males with some on delayed photoperiod. This is not a solution from a practical standpoint as space and labour is the overriding concern. Rather, evidence suggests that hormonal supplementation of the males late in the spawning season can be a more immediate and cost-effective solution.

Objectives

The overall objective of this study was to develop techniques and protocols for Ovaplant use in halibut thereby increasing the species base for Ovaplant use. Specifically, the objectives for this study were:

- To increase milt quality and quantity in late season halibut males, and
- To determine the number of Ovaplant implants needed to sustain low spermatocrit.
- To achieve these objectives Ovaplant was implanted in to mature male halibut during the spawning season when spermatocrits were increasing. Control fish received placebo implants.

Methods

Halibut spawn from February to the end of May. Nine male halibut were contained at the Department of Fisheries and Oceans St. Andrews Biological Station facility. These fish are from several brood years and were all taken from the wild; time in captivity varies with individuals. Age of the fish is unknown, however, all fish were mature in prior spawning seasons. Two to three weeks of baseline data (every 3-5 days) was collected during the peak spawning period before noticeable changes in sperm quality are evident. After the these data indicated that sperm quality was deteriorating, six male halibut were implanted intramuscularly with a single Ovaplant pellet to achieve a dose rate of around 15m g/kg sGnRH α . For comparison, three males were implanted with placebo pellets. After each implantation male fish were sample stripped of milt at approximately weekly intervals post-implant. After approximately 2-3 weeks (the life of an Ovaplant pellet) three of the six Ovaplant implanted males received a second Ovaplant. Sampling regimen continued until spawning of females was complete.

Two-tailed t-tests were used to determine difference between two values. One-way and two-way ANOVAs (Tukey's and Duncans) were used to determine differences between groups of values. Significance is accepted at the $P < 0.050$ level.

Results

The spawning period for halibut had duration of 70 days. There were five sampling periods prior to implantation of the Ovaplant or control implants. Initial implants were administered 29 days

post initial spawning of the population. The second implants were administered on day 44 post initial spawning. Samples of milt were collected for all fish and used in fertility trials with several sub-sets of eggs from females. These data await analysis.

Placebo controls

Spermatocrit (Sc) in control fish were 59.7 ± 5.5 (SEM) and rose significantly ($P=0.010$) over the course of the spawning season to 93.3 ± 3.2 . Sc at time of implantation (66.0 ± 9.5) was not different with either group of experimental fish (88.5 ± 1.5 and 81.5 ± 2.3). Extraction of milt from control fish became difficult around day 50 of the experiment as observed by volume and viscosity.

Single Ovaplant administration

Seven days post-administration of Ovaplant, Sc decreased ($P= 0.034$ and 0.026) in all males (both experimental groups). In the single implant group, this effect was evident for two more sampling times (to day 41). Values for this decrease were 88.5 ± 1.5 pretreatment (day 29) to 58.0 ± 5.2 (day 36) and 65.0 ± 3.6 (day 41). There were no further differences in Sc to the end of the spawning season and values reached control levels before the end of spawning.

Two Ovaplant administrations

After the initial Ovaplant administration, Sc levels dropped significantly ($P=0.026$). Sc levels were lower than pretreatment values for at least six weeks (day 70). Administration of the second Ovaplant inferred effect to maintain low Sc for the duration of the experiment. At the end of spawning in all groups, Sc was lower in the group receiving two serial implants than control fish ($P=0.038$). Values for this sampling were 93.3 ± 3.2 for control and 46.8 ± 10.6 for the group receiving two serial implants.

Conclusions

From the data here, the following is inferred:

- Ovaplant administered to male halibut in the spawning season served to decrease spermatocrit within seven days,
- Effect was maintained for up to three weeks post treatment,
- Serial administrations of Ovaplant extended effect.

There are limitations to this study in that the sample size was small and that spermatocrit may not infer fertility or sperm density. However, even with the sample sized used, differences in Sc were identified as a result of treatment which were repeatable and sustained. From previous experience with halibut, the researchers have demonstrated that altered Sc is related to fertility. This will be borne out by pending fertility data. In sum, protocols for Ovaplant use in male halibut were defined and Ovaplant is shown to be effective in reducing spermatocrit and maintaining milt quality.