SPAWNING KINETICS OF GREATER AMBERJACK *Seriola dumerili* IN RESPONSE TO MULTIPLE GnRHa INJECTIONS OR IMPLANTS

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Introduction

The greater amberjack (*Seriola dumerili*) is a species with high potential for the diversification of the aquaculture production, due to its excellent flesh quality and high worldwide consumer acceptability. One of the main obstacles for its aquaculture production is the lack of reliable reproduction of fish maintained in captivity. Agonists of gonadotropin-releasing hormone (GnRHa) have been used to overcome these problems in many fishes, and the present study compared hormonal spawning induction methods with GnRHa using either injections or implants.

Materials and methods

Wild-captured breeders (mean weight 17.0±2.6kg) were kept in Argosaronikos Fish Farm S.A. in a 1,000m^3 cage during the year and were fed with a broodstock diet (Skretting, Vitalis Cal, 22mm). The spawning trial was conducted between 7-28 June 2016. Females were treated with a GnRHa injection (20-25μg GnRHa kg^{-1}) or with Ethyl-Vinyl Acetate copolymer (EVAc) GnRHa implant (Mylonas and Zohar, 2001), with an effective dose of 49-69μg GnRHa kg^{-1}. To enhance spermiation and ensure adequate sperm production, all males were treated on 7 June 2016 with a GnRHa implant at a dose of 45-70μg GnRHa kg^{-1}. After being treated for spawning, fish were transferred to the inland facility into each of four 23m^3 flow-through round tanks (n=3-4 females), in a 1:1 sex ratio. Females in the injected group were given a GnRHa injection every week for 3 weeks, whereas the implanted group was given a second implant after two weeks (a total of 3 injections and 2 implants). Tank overflow egg collectors were examined three times a day, and fecundity and fertilization success were estimated immediately after egg collection. Egg and larval quality parameters were estimated using the microtiter plate method (Panini et al., 2001) with some modifications.

Results and discussion

Spawning started 1d after the 1st application, as some females had oocytes already undergoing maturation. Implanted fish spawned for 9-10 times after the 1st implant and only 4 times after the 2nd implant. Injected fish spawned 7, 3-5 and 1-3 times after the 1st 2nd and 3rd injection, respectively. The highest fecundity was produced by the GnRHa implanted fish and was 4 242 000eggs $tank^{-1}$ two days after the 1st treatment, while in the injected fish the highest fecundity was 2 454 000eggs $tank^{-1}$.

Mean daily relative fecundity was higher in implanted fish (15 170±2 738eggs $kg^{-1}day^{-1}$) compared to the injected fish (6 119±2 790eggs $kg^{-1}day^{-1}$)(Fig.1A). Total relative fecundity was also higher in implanted fish (102 402±20 337eggs kg^{-1} $tank^{-1}$) compared to the injected (26 517±9 938eggs kg^{-1} $tank^{-1}$)(P=0.003) (Fig.1B). Total egg production was decreasing in injected fish after consecutive GnRHa treatments (P=0.005), while in implanted fish no statistical differences were observed between the subsequent treatments (P=0.17)(Fig.1B).

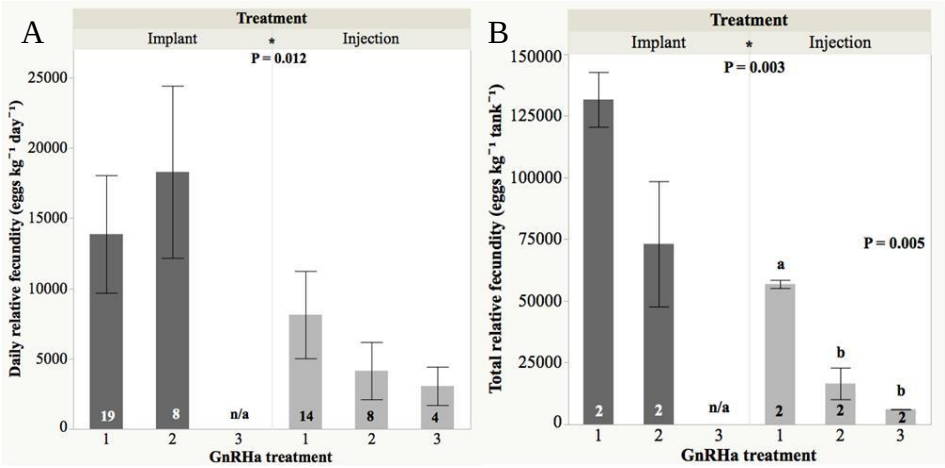

Fig.1. Mean daily relative fecundity (± SEM)(A) and mean total relative fecundity (± SEM)(B) of GnRHa implanted (dark grey) or injected (light grey) greater amberjack *Seriola dumerili*. Numbers in bars are the spawns (A) or the number of tanks (B) constituting each mean. Asterisks indicate differences between treatment methods (t test, P = 0.012 or P = 0.003) and lowercase letters between treatment number (ANOVA, Tukey HSD, P = 0.005).

Fertilization success, 24-h embryo survival, hatching and 5-d larval survival was similar between the two GnRHa treatment methods, while no statistical differences were observed among different treatment numbers. Mean fertilization success was 36±5% and 24-h embryo survival 53±7% for both treatment methods. Additionally, hatching was 70±4% and 5-d larval survival was 20±4% over the course of the study.

Conclusions

The GnRHa implanted fish produced 2.5X more eggs than the injected fish, with the same number of spawns. On the other hand, no differences were observed among the two treatment methods in terms of fertilization success, embryo survival, hatching and 5-d larval survival.

References

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