Hormonal induction of spawning in the meagre (*Argyrosomus regius*)

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Introduction

The meagre, *Argyrosomus regius*, belongs to the family Sciaenidae and is a gonochoristic species. Its reproductive maturation is achieved after four years of life and during the reproductive period (April-July) at a temperature of 17-22˚C a female of a total length of 1.2 m in total length can produce around 800,000 eggs, at 3-5 spawnings, as this species is a multiple spawner (FAO 2009). The meagre is a new candidate species for aquaculture (Quéméner et al., 2002), but it does not spawn spontaneously in captivity, necessitating the development of protocols for spawning induction (Duncan et al., 2008). The aim of the present study was to investigate the effectiveness of GnRHa implants in inducing maturation and spawning of meagre, both in mixed-sex tanks and in tanks containing individual females, in order to estimate better individual female fecundity and spawning kinetics.

Materials and methods

In 2009, three different spawning induction trials were conducted. Fish (mean ± SD body weight of 6.9 ± 1.9 kg) were implanted on 5/5/2009 (3 females and 3 males), 18/5/2009 (4 females and 5 males) and 9/6/2009 (4 females and 4 males) and placed in 9000-l tanks for spawning. In 2010, six individual females were placed in separate 5000-l tanks with two males each (mean body weight of 8.2 ± 2.2 kg) on 4/5/2010 and 3/6/2010. Fish were fed daily with industrial feed and three times a week with frozen squid. Water temperature was between 16.3 and 24.7˚C. Fish were treated with an EVAc GnRHa implant at dose of approximately 50 µg Kg^{-1} (Mylonas and Zohar, 2001). Egg collection was achieved by a system of surface water collection. A sample of eggs was collected from each spawn for the estimation of fecundity and fertilization percentage. Results were analyzed by ANOVA, followed by Duncan's New Multiple Range test (DNMR), at a minimum significance of $P<0.05$ (Super Anova, Abacus Concepts Inc., USA).

Results and discussion

In 2009, in all cases, spawnings started two or three days after GnRHa implantation, mean relative fecundity $spawn^{-1}$ ranged from 24,300 to 49,900 eggs Kg^{-1} female body weight and mean fertilization percentage from 85 to 87%. The number of spawns was between 7 and 17 and mean total annual relative fecundity was 365,000 ± 107,000 eggs Kg^{-1} $year^{-1}$. No statistically significant difference was found between different dates on relative fecundity or fertilization percentage. In 2010, the first spawning was always observed two days after implantation, and mean total annual relative fecundity was 435,000 ± 199,000 eggs Kg^{-1} $year^{-1}$. The number of spawns ranged between 5 and 19, relative fecundity ranged between 28,540 and 59,380 eggs $spawn^{-1}$ Kg^{-1} female body weight and fertilization percentage ranged from 85 to 95% (Table 1). After the first spawning, susequent spawnings occurred for at least 5 more days and after a pause of maximum two days spawnings kept on. Relative fecundity reached its maximum during the first 4 spawnings and then decreased gradually. On the contrary, fertilization percentage was constantly high during the spawning period (Fig. 1). No statistically significant difference was observed, either between individual females or between different implantation dates.

It is concluded, that meagre can spawn reliably after hormonal induction between May and June with the same effectiveness, with a mean egg production of 40,800 ± 36,900 eggs Kg^{-1} $spawn^{-1}$ and a mean fertilization percentage of 92 ± 8% in 11 ± 5 spawns. The results obtained in the present study will be useful for the broodstock management of meagre in commercial operations, helping hatchery managers plan better their production.

Table 1. Number of spawns, relative fecundity $spawn^{-1}$, total annual relative fecundity and fertilization percentage of the two spawning induction trials conducted in 2010.

Number of female	Date of implantation	Spawns	Eggs/ Kg/ Spawn	Eggs/ Kg/ Season	Fertilization (%)
1	05/04/2010	5	33,625	168,127	89
2	05/04/2010	10	28,540	285,401	85
3	05/04/2010	6	59,381	356,286	87
4	06/03/2010	14	49,957	699,394	93
5	06/03/2010	10	52,207	522,066	95
6	06/03/2010	19	30,415	577,886	95

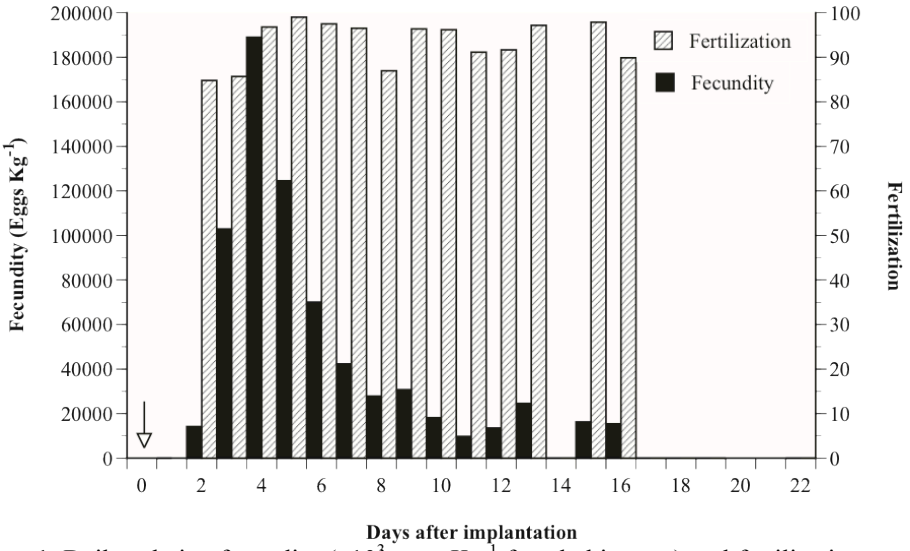

Figure 1. Daily relative fecundity ($x10^3$ eggs Kg^{-1} female biomass) and fertilization success (%) of successive spawnings of a single female meagre after GnRHa implantation on June 3, 2010. The arrow refers to the day of the implantation.

References

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