



Paired spawning with male rotation of meagre *Argyrosomus regius* using GnRH α injections, as a method for producing multiple families for breeding selection programs

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ABSTRACT

Weekly gonadotropin-releasing hormone agonist (GnRH α) injections were used to induce spawning in paired male and female meagre (*Argyrosomus regius*) with a weekly rotation of the males, in order to produce a large number of families, as a method to facilitate selective breeding programs. Two different broodstocks were used (HCMR and IRTA), with females of mean weights of 11.7 ± 2.6 kg and 20.0 ± 1.8 kg, and males of 10.2 ± 1.2 kg and 15.1 ± 1.0 kg, respectively. A single GnRH α injection of $15 \mu\text{g kg}^{-1}$ was administered to each selected female, and 7.5 or $15 \mu\text{g kg}^{-1}$ to each male to induce spawning. In the subsequent weeks, maturity was checked and fish were induced as above, but males ($n = 18$) were rotated to form a different pair with the selected females ($n = 21$). Experiments finished when all paired combinations had been completed or a fish lost maturity status and could not be induced further. A total of 56 families were produced with a mean number of eggs from each family of $87,666 \pm 11,244$ eggs kg^{-1} . There was a decline in the fecundity, number of spawns and percentage of pairs that spawned successfully after consecutive weekly GnRH α injections. Relative fecundity declined significantly from $134,495 \pm 25,557$ eggs kg^{-1} female body weight after the first injection, to $44,252 \pm 17,638$ eggs kg^{-1} after the fourth injection. However, there were no differences amongst weeks in egg fertilization success, hatching success or larval survival to 5 days post hatch. The decrease in fecundity and spawning success was attributed to a loss of maturity observed in the females, which may be related to differences in mate selection strategies between male and female meagre. The study demonstrated that paired spawning with male rotation was a successful method that can be used for breeding programs to produce a limit of three families per female or as a scaling up step to produce large numbers of offspring from a limited number of selected pairs.

1. Introduction

The aquaculture production of meagre (*Argyrosomus regius*, Sciaenidae) has increased rapidly in the last decade from 859 t in 2004 to 11,770 t in 2014 (FAO 2005–2017). This increase has been in part due to the development of effective spawning induction methods (Duncan et al., 2012; Duncan et al., 2013a; Fernández-Palacios et al., 2014; Mylonas et al., 2013a, 2015, 2016), since meagre rarely undergo spontaneous oocyte maturation, ovulation and spawning in captivity

(Duncan et al., 2013a; Gil et al., 2013; Mylonas et al., 2013b; Soares et al., 2015). Both liquid injections and controlled-release delivery systems that release gonadotropin-releasing hormone agonist (GnRH α) for a prolonged period of time have been shown to be effective in inducing maturation and multiple spawns in females (Duncan et al., 2012; Duncan et al., 2013a; Fernández-Palacios et al., 2014; Mylonas et al., 2013a, 2015, 2016). The differences in spawning kinetics and production characteristics showed that multiple GnRH α injections resulted in more consistent spawning results and better control of egg

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