

## Rearing in captivity affects spermatogenesis and sperm quality in greater amberjack, *Seriola dumerili* (Risso, 1810)<sup>1</sup>

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**ABSTRACT:** The greater amberjack, *Seriola dumerili* (Risso, 1810), is a promising candidate for the diversification of European aquaculture production, but inconsistent reproduction in captivity prevents commercial production. Recent studies showed that greater amberjack confined in sea cages exhibited scarce gonad development and early interruption of gametogenic activity during the reproductive season. The aim of the present study was to improve our understanding of the observed impairment of spermatogenesis. Adult wild and captive-reared males were sampled during 3 different phases of the reproductive cycle: early gametogenesis (EARLY; late April to early May), advanced gametogenesis (ADVANCED; late May to early June), and spawning (SPAWNING; late June to July). Spermatogonial stem cells and proliferating germ cells were identified through the immunohistochemical localization of *Pou5f1* and proliferating cell nuclear antigen, respectively. Apoptotic germ cells were identified throughout the terminal deoxynucleotidyl transferase-mediated 2'-deoxyuridine 5'-triphosphate nick end labeling

method. Sperm quality of captive-reared fish was evaluated using computer-assisted sperm analysis. Captive-reared males exhibited seminiferous lobules of a smaller diameter, a precocious and progressive decrease of spermatogonial mitosis, and a high level of apoptosis at the beginning of the reproductive season, concomitant with a many-fold higher 17 $\beta$ -estradiol plasma concentration. The motile spermatozoa percentage of captive greater amberjack was lower than in other teleosts, and a drastic decrease of spermatozoa motility duration, velocity, and ATP content occurred along the reproductive season. An abnormal increase of sperm concentration as well as an increase of dead spermatozoa occurred during the SPAWNING phase, probably because of lack of sperm hydration and ejaculation and consequent sperm ageing. The present study demonstrates the extreme susceptibility of greater amberjack to rearing stress and underscores the need for improvement of the rearing and handling procedures to ameliorate gametogenesis dysfunctions in commercial aquaculture production.

**Key words:** germ cell apoptosis, germ cell proliferation, greater amberjack, rearing in captivity, *Seriola dumerili*, sperm quality

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