

observed in black hakes (*M. polli* and *M. senegalensis*) off Mauritania

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INTRODUCTION

The black hakes, *Merluccius polli* and *M. senegalensis*, are target species of a trawl Spanish fleet in Mauritanian waters. *M. polli* is a deep-water hake while *M. senegalensis* has a shallower distribution. Both species are gutted and mixed in the landings, although the deeper hake constitutes a greater fraction of the catch (85%) due to the fishing strategy of the trawl fleet. Scant information is available on the reproductive aspects of these species. The reproductive period extends from October to March with a defined peak in December - January. Females of both species reached size at first maturity at the same length (39,2 cm) in 2003 (Fernández-Peralta *et al.*, 2006). The present study is a first approach to ovarian histology of *M. polli* and *M. senegalensis*, and is intended to provide basic knowledge for further detailed studies on the reproductive biology of these species, essential for an adequate assessment of this stock.

MATERIALS AND METHODS

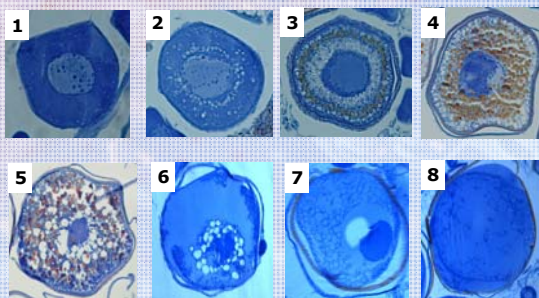
Female gonads were collected during an experimental survey carried out between November and December 2003 in Mauritanian EEZ. Mature ovaries of 16 and 14 specimens of *M. senegalensis* and *M. polli* were analyzed respectively. The size range and the dates of capture were similar for both species. Ovaries were preserved on board in 10% buffered formalin and a portion of the central part was processed by a standard histological technique. The samples were sectioned at 10 μ m with a microtome and stained with Mallory's Trichrome Stain. Histological characteristics of ovarian tissues and oocyte stages were examined by light microscopy and photographed in a Leyca photomicroscope. Oocytes of different categories were measured in 3 specimens of each species by means of an image analysis system (Image-Pro Plus V. 6.0)

RESULTS AND DISCUSSION

Merluccius polli



M. senegalensis



OOCYTE STAGES:

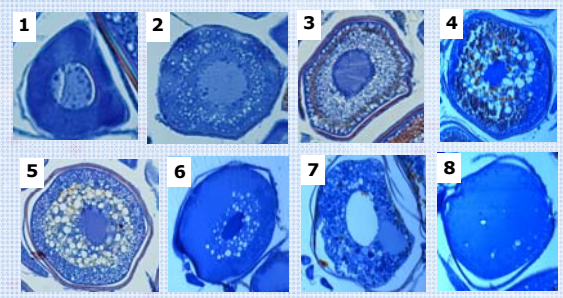
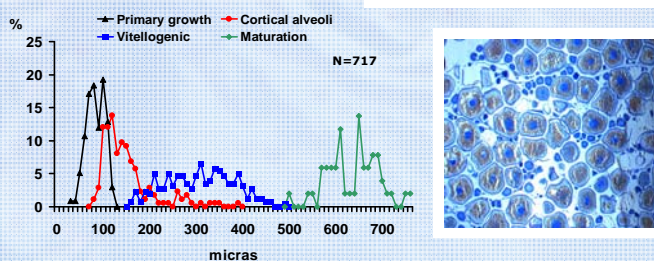
- (1) perinucleolar
- (2) cortical alveoli (Murua, 2006)
- (3) early vitellogenic
- (4), (5) advanced vitellogenic
- (6) early migration (maturation)
- (7) migration (maturation final)
- (8) hydrated

• The histological examination showed the oocyte's development from the early vitellogenic (1), advanced vitellogenic (8), early migration (3) and to the migration and hydrated stage (2).

• Absence of Post-Ovulatory Follicles (POF)

• Low Index of atresia:

• Oocyte size distribution suggest an indeterminate fecundity

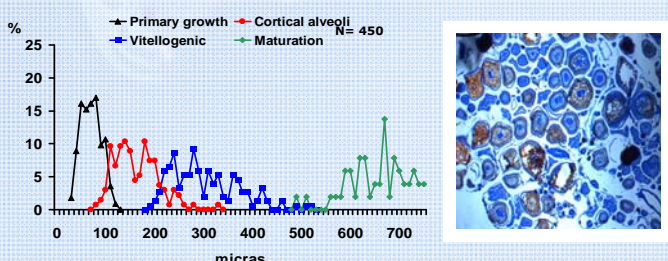


• The females mature showed the oocyte's development from advanced vitellogenic (4), early migration (3) and to the migration and hydrated stage (9).

• High Presence of Post-Ovulatory Follicles (POF) in different stages of deterioration

• Low Index of atresia

• Oocyte size distribution suggest an indeterminate fecundity



In this study, the females of *M. senegalensis* showed an early spawning compared to *M. polli*. In the shallow-water hake, the abundance of POF and the presence of oocytes's final maturation stage in the majority of their gonads indicated a recent batch spawning episode and a spawning event during the catch moments. This observation is concordant with the values of GSI obtained for both species in these waters in 2003-2004 (Fernández-Peralta, *et al.*, 2006). Atretic stages were observed, but their incidence was low because the sampling period corresponds to the beginning of the spawning season. The delay of the beginning of the spawn period, as well as their different bathymetric spawning habitat (Fernández-Peralta, *et al.*, 2007) could involve mechanisms avoiding hybridization. An environmental study in their zone of distribution could help to explain the reproductive pattern in these hakes. The species are multiple batch spawners with asynchronous development of oocytes and, probably, an indeterminate fecundity as suggested by their oocyte size frequency distribution in the ovary.

Despite the observed differences, these are not so outstanding (the time lag can represent about a month). The same size at first maturity of both species and the scarce abundance of the coastal hake do justify the joint evaluation of both species. Nonetheless, the estimate on the fecundity of both species, as well as, the progress in the knowledge on their reproductive biology allows us to consider whether the black hake is a single-stock entity for the purposes of assessment and management.