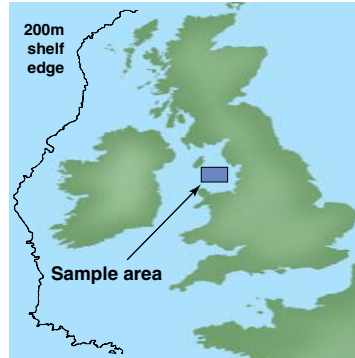


Introduction

Studies on fecundity of individual females are necessary to estimate spawning stock biomass independently of commercial fishing. These studies should also assess the role of atresia to determine the number and rate vitellogenic follicles become atretic. Atresia probably follows the same biochemical mechanism as apoptosis and the detection of DNA fragmentation patterns, characteristic of apoptotic cells, may provide a better method.

Methods

Ovaries were collected from wild Irish Sea Dover sole just before and during spawning (see right). Some fish were held in captivity to study atresia development. Atresia was determined in all fish by stereological analysis and the DNA method developed using ovary tissue from the captive fish.

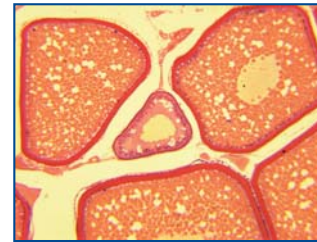


Captive fish (mostly pre-spawning)

The partial volume of atretic follicles in the ovary (V%) and the median atretic follicle (MD) diameter are shown after 0, 5 and 12 days in captivity. Values are the mean of three fish with (1 se).

PAS Mallory stained 5µm ovary sections

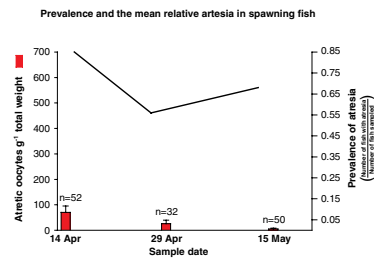
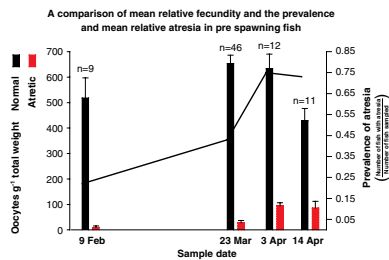
500µm



0 Days V% = 0.37 (0.21) MD = 169 (2) (value=1 se). Ovaries showed either normal vitellogenic follicles (left) or mostly small atretic follicles (right).

Results

Wild fish (pre-spawning and spawning)

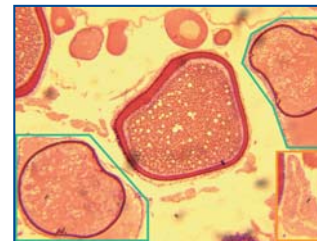


Mean relative¹ fecundity ■

Mean relative atresia excluding fish with no atresia ■

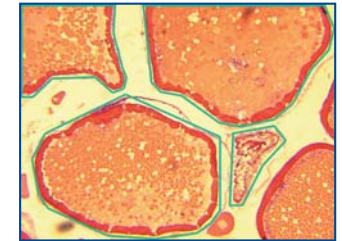
Prevalence of atresia (Number of fish with atresia / total number of fish sampled). —

¹ Values for fecundity and atresia were normalised for fish size by dividing by the fish weight.



5 days V% = 1.82 (0.9)

MD = 293 (67)



12 days V% = 3.57 (1.27)

MD = 367 (48)

Post ovulatory follicles ■ were present in two fish indicating spawning had started in the population. The partial volume and median diameter of atretic follicles increased during captivity. DNA banding was observed after gel electrophoresis, indicating the presence of fragmented DNA, characteristic of apoptosis.

Conclusions

Follicular atresia shows the highest levels in fish at the start of spawning. It should be discounted from the potential fecundity to give an unbiased estimate stock size (based on dividing the population egg production by the mean individual potential fecundity). Based on morphology and size atresia is more likely to occur in small vitellogenic follicles suggesting a regulatory role ie to control egg production.