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Fecundity regulation, maturation progression and spawning fidelity in relation to size, condition and age of Baltic herring (*Clupea harengus* L.)

Rikke Hagstrøm Bucholtz, Jens Randel Nyengaard, Johnnie Bremholm Andersen, Jonna Tomkiewicz

Forage fish are important components of marine ecosystems. In the Baltic Sea, herring and sprat are main forage fish. Population changes in these stocks affect the food web and function. We focused on the Central Baltic herring populations, which have changed significantly over time. Sampling was done in the Bornholm Basin March 2008, providing a female demography snapshot just prior to spring spawning season. The stock includes spring, autumn and winter spawners distinguished by otolith hatch marks. Our aim was to elucidate how size, condition and age influence individual reproductive capacity; potential fecundity (F_P) may be down-regulated through atresia, and spawning season change compared to individual hatching season. Analyses included potential fecundity, down-regulation (total volume fraction of atretic oocytes, AT_{VF}), maturation progression (maturity stage), size, condition (Fulton's K , somatic lipid content), and age. F_P and AT_{VF} were quantified using stereology. F_P was strongly correlated to size, and significantly down-regulated during maturational stages; AT_{VF} being highest during mid vitellogenesis. A strong relationship between maturation progression and size, condition and age was evident. Larger individuals were either in early developing stage, i.e. non-spawners, with poor condition, or late in vitellogenesis, i.e. spawners, with good condition. Vitellogenic maturation progression depended on size, condition and age; specimens in early vitellogenesis being smaller, younger and of poorer condition. Signs of recent spawning were found in spring hatch type specimens with early developing ovaries evidencing switch of spawning season. Results indicate that spawning can occur throughout the year independent of hatch type.

Keywords: Stereology, somatic lipid content, atresia, skipped spawning, otolith analysis

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