INSIGHTS ABOUT THE CONDITION OF *Sardinella brasiliensis* BASED ON OTOLITH WEIGHT

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INTRODUÇÃO

Fish otoliths have multiple applications due to their properties (Volpedo & Vaz-dos-Santos, 2015). Particularly, otolith biometry constitutes a powerful tool to infer age and growth patterns, life phase changes related to maturity, migration and other events, highlighting the otolith weight (Araya *et al*. 2001, Francis *et al*. 2005). The most important marine fishery resource of Brazil is the sardine Sardinella brasiliensis (Steindachner, 1879), whose sagittal otoliths have been used in morphometric studies (Perin & Vaz-dos-Santos, 2014). In this way, is the otolith weight of S. brasiliensis helpful for biological diagnostics of the species?

OBJETIVO

Verify temporal variations in the otolith weight of S. brasiliensis and infer their association with biological events (e.g. gonad maturation, spawning, and growth ring formation).

MATERIAIS E MÉTODOS

Otoliths were obtained from samplings in commercial landings of S. brasiliensis during 2013-2014, comprising the continental shelf of Southeastern Brazilian Bight (22°S-28º40'S), Atlantic ocean. Total length (TL, mm), total weight (TW, g) and otolith weight (OW, g) were attained in laboratory. The relative condition factor (Kn) (Le Cren, 1951), an indicator of reproductive biology, was individually calculated with the parameters of the length-weight relationship (LWR) fitted for the sample. Data analysis was performed by year-season (three months grouped). Significant differences among mean Kn values were tested with a Nested ANOVA. Deviation of mean Kn values from the referential (Kn = 1) were also tested (t-test one sample). Power models (OW = aTLb) were fitted for all data pooled and for each year-season, being compared with an ANCOVA. Allometric growth (b deviation from 2, a reference for lateral compressed otoliths) were tested (t-test one sample). Corrected otolith weights (OWc) removing the size effect (cf. Lombarte & Tuset, 2015) were estimated, and their means by year-season also compared with a Nested ANOVA. All models were fitted using non-linear least square method, being evaluated with the standard error of regression value and residue analysis (Vaz-dos-Santos, 2015). All statistical procedures were performed with alpha=0.05.

DISCUSSÃO E RESULTADOS

A total of 752 specimens of S. brasiliensis (147 ? TL ? 282 mm, mean 222.26 mm) were analyzed, predominating individuals between 200-230 mm TL in all periods analyzed. The LWR fitted was TW =4.57711×10-6TL3.11677. The mean Kn values decreased from the summer to the winter both in 2013 (1.022 to 0.969) and 2014 (1.073 to 0.952), increasing again in the spring (0.982 in 2013 and 0.988 in 2014). There were significant differences among seasons ($F = 17.28$, $P < 0.001$). Kn values also differed from one ($P < 0.05$, t tests), except for the spring of 2014 ($P = 0.237$). Otolith weight varied from 0.0009 g to 0.0054 g, mean 0.00249 g. Pooled TL-OW model coefficients were a = 1.27675×10-8and b = 2.25050. Coefficients of year-season models varied from 4.6884×10-9 to 3.2120×10-7 (a values) and 1.651 to 2.433 (b values). Models differed among themselves ($F = 943.17$, $P < 0.0001$) and coefficients revealed isometric growth of otolith weight ($P > 0.05$). Mean OWc values presented significant difference among seasons ($F = 6.47$, $P < 0.001$), the highest values occurring in the winter-spring and the lowest in the summer-autumn. Both in 2013 and 2014, lower values of Kn and OWc means as well as the b coefficients were recorded during the summer. In the autumn, they decreased, increasing in the winter and spring. What does it mean? The samples came from commercial landings, in which the selectivity of purse seine nets allied to the minimum allowable catch size (170 mm) led only to adult catches (Cergole & Dias Neto, 2011). The gonad maturation occurs from April to September (autumn-winter), and then the spawning extends from October to March (spring-summer) (Cergole & Dias Neto, 2011), when we found the best condition (highest Kn values). This is related to gonad development, especially in females, whose ovaries become heavier and bigger. At the same time, highest b values of regressions were compensated by a values (the well know antagonist effect of regression parameters) and otolith tend to be less heavy (OWc mean values) just in the summer, coupled to the spawning peak. This justify the otolith growth ring formation, indicating the expected reduction in the somatic growth, following a historical pattern recorded for the species (Perin & Vaz-dos-Santos, 2014).

CONCLUSÃO

The match in the results obtained for S. brasiliensis regarding relative condition factor (Kn), total length-otolith weight relationships and corrected otolith weight (OWc) confirms that the otolith weigh is suitable for biological inferences. It was a good indicator of sardine life events during two successive years. Studies with referential values, like the current one, allow the posterior monitoring of S. brasiliensis biology at landings, with the benefits of otolith use: no changes due to freezing, no damage during manipulation, easy cost acquisition and conservation. Further studies already started will evaluate the relationship between otolith weight and age, a key issue for stock assessments.

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