

AGE AND GROWTH OF HAKE IN THE WESTERN MEDITERRANEAN AND THE STRAIT OF GIBRALTAR

Abdelaziz Zoubi ¹ *, Mohamed Hamouda ² and Abdeljaouad Lamrini ²

¹ Institut National de Recherche Halieutique (INRH), 2 Rue de Tiznit, Casablanca, Morocco - abdelaziz_zoubi@hotmail.com

² Institut Agronomique et Vétérinaire Hassan II, Rabat Instituts, Morocco.

Abstract

The age and growth of European hake was undertaken for the Moroccan Mediterranean and the Gibraltar Strait regions. The comparison of the von Bertalanffy growth parameters in both regions and between regions, showed significant differences between males and females for all three growth parameters.

Keywords : Demersal, Growth, Strait Of Gibraltar.

Introduction

The European hake, *Merluccius merluccius*, L.1758, is a species with a high commercial value. The present study focused on the comparison of the precision of age determination and the growth of this species between the Mediterranean and the Strait of Gibraltar regions by the use of a multivariate analysis.

Material and Methods

The area of study covered the hake fisheries off the Mediterranean and the Strait of Gibraltar regions of Morocco. The Mediterranean region extends from Algeria borders to Tangier; while the Gibraltar Strait region, contiguous to the latter, extends from Tangier to Larache.

The samples used in this study were collected by using a stratified random sampling of hake captures carried out in 2004 and 2006 surveys in the Mediterranean region, and in 2004 and 2005, from monthly commercial landings of trawlers in the Gibraltar strait region at the fish auction of Larache.

Samples of 510 individuals, ranging in size between 10 and 60 cm total length, were sexed, measured for total length to the nearest centimeter and weighted with a precision of 0.1 g. For age determination, 10 sagittal otoliths by length class of 1 cm, were removed, washed, viewed whole and sectioned, with a magnification of 50x. Each otolith was read three times. The standard deviation and the Percentage of Agreement between age-readings were calculated for whole and sectioned otoliths [1]. Age readings were analysed with a spreadsheet developed by Guus Eltink [2]. The von Bertalanffy growth parameters using sectioned otoliths were estimated by region, separately for males and females using the length-age keys established by using FISHPARM program [3]. Hotelling's T² test [4], was used to compare growth parameters between male and females in each region and between the two regions for each sex separately.

Results and discussion

In both regions, high Percentage of Agreement, between the age-readings (over 89% for whole otoliths versus 100% for sectioned ones), was observed for young individuals; but as fish got older for both regions, the distinction of age rings became hard to distinguish, especially for whole otoliths due to their overlappings; thus, for older individuals, the Percent Agreement underwent a sharp decrease (49% and 67% respectively for whole and sectioned otoliths); while the standard deviation increased from 0.33 to 0.72 and 0.57 respectively for whole and sectioned otoliths. These results indicate that age determined by using whole otoliths is underestimated especially for old individuals.

Tab. 1. Von Bertalanffy growth parameters with standard errors (SE) for hake by sex and region; n is the sample size.

Region	Sex	n	L _∞	SE	K	SE	t ₀	SE
Mediterranean	male	236	64.10	21.95	0.167	0.01	0.299	0.05
	female	248	81.57	26.19	0.124	0.01	0.195	0.06
Gibraltar Strait	male	238	78.49	40.62	0.106	0.10	-0.418	1.20
	female	244	102.35	50.50	0.075	0.06	-0.756	1.00

Von Bertalanffy growth parameters were calculated by region, separately for males and females (Table 1). In both regions, significant differences between males and females were found for all three growth parameters (Hotelling's T² tests, P < 0.001); females grew faster and on average were larger than males of the same age in both regions. The study showed for the Gibraltar Strait region a slightly higher asymptotic length (L_∞), for

females. Similar comparisons were made between regions for each sex separately. For each sex, all three growth parameters were significantly different between the Mediterranean and the Strait of Gibraltar regions (Hotelling's T² test, P < 0.001).

The data in our study confirmed that females grow faster than males for both regions, as found in a previous study [5].

Growth rates of fish can be affected by many factors including differences in the seasonality of spawning, environmental factors (temperature), amount of food, and genetics [6].

References

- 1 - Beamish, R. J. and Fournier D.A., 1981. A method for comparing the precision of a set of age determinations. *Can. J. Fish. Aquat. Sci.*, 38: 982-983.
- 2 - Eltink A.T.G., Newton W., Morgado C, Santamaria M.T.G. and Modin J., 2000. Guidelines and tools for ageing reading comparisons-version 1.October 2000. EFAN Report 3-2000, 75 p.
- 3 - Saila S. B., Recksiek C.W. and Prager H., 1988. Basic fishery science programs. A compendium of Microcomputer programs for the growth parameters evaluation operation. Elsevier, Dev. Aquacult. Fish. Sci., 18 : 231 p.
- 4 - Bernard D. R, 1981. Multivariate analysis as a means of comparing growth in fish. *Can. J. Fish. Aquat. Sci.*, 38: 233-236.
- 5 - Recasens L., 1992. Dinámica de poblacion I pesqueria del lluç (*M. merluccius*) al golf de Lleo I la mar Catalana. Ph.D. Thesis. Univ. Barcelona, 398 p.
- 6 - Weatherly A.H. and Gill H.S., 1987. The biology of fish growth. Academic Press, Orlando, FL, 443 p.