GROWTH OF HAKE IN THE BALERIC SEA: A PROPOSAL OF NEW GROWTH MODEL WITH HIGHER GROWTH RATES.

F.ALEMANY & p.OLIVER.

Centro Oceanográfico de Baleares. I.E.O.

With the hake as the target species of the trawling fleet in the Mediterranean sea it is essential to know its growth performance in order to apply analytical models of populations dynamics. This allows one to understand and predict the evolution of the exploited stocks. So, many studies about the growth of Mediterranean hake have been carried out for several decades; but up to now the results cannot be considered as definitive due to some methodological problems. Specialists have not reached an agreement in interpreting the otholits or scales (1) and it's difficult to observe clear modal progressions in length frequency samples. The variability of sampling methods and base data processing also bias the results.

Within the framework of a CEE/FAR project (2) a working group was formed with the main objective of study growth of hake in several areas of Western Mediterranean, applying a consensuated methodology for estimating Von Bertalanffy growth parameters from length frequency analisys.

Some of the results obtained refering to the growth of hake in the Balearic Islands are given later.

The base data for carrying out this study were the monthly length frequency distributions of the hake landed in Palma harbour in the years 1990 and 1991, which were obtained by aleatory stratified sampling taking into account the three commercial categories into which the catch is separated. The weighted length frequency distributions were separated into male and female ones, grouped toghether quarterly and smoothed by using a running average over 3 data.

The resultant quarter length frequency distributions were broken down into normal components by using Battacharia's method. For females each length frequency distribution was composed of three to five normal groups. Growth of males was not studied with this method because only two modes appeared at each length frequency distribution and modal progression could not be distinguished. The obtained modal lengths for female distributions are shown in Figure 1. It must be pointed out that expected distributions, with the exception of the first quarter of 1990, were not significantly different from the observed ones. On the other hand the mean value of the standard deviations from the modal value of each normal component was 2.88, with a standard deviation of 0.64.

Two main conclussions can be drawn from these results: it seems to be an evident progression of the modal lengths along the years and the temporal distance between two consecutive cohorts is not one year, but only about six months.

In order to obtain the Von Bertalanffy growth parameters an age of one year was given to the first detected modal size of the second quarter of 1990, taking it as a reference point for assigning the remaining ages. This age was calculated taking into account the projection on the axis X of the lines that fit the developement of the modal sizes of each, the value of the length increment in the second year and the spawning peaks detected in this area. From these "lenght at age" data, with exception of two with an age of 0.75 years, which were probably biased due to the rejection of specimens smaller than 18 cm because of the minimum legal size, growth parameters were calculated by using the FISHPARM software package. Results are shown in Table 1 and proposed growth model for female hake of the Balearic Island stock in Figure 2.

This growth rates are much higher than those generally accepted, based on otholiths reading; but they agree absolutely with a growth model for Atlantic Hake presented recently at the 1993 ICES meeting

(3) and with the only datum which we know from tagging experiments for this species (4), where a recaptured specimen had grown 11.7 cm in 8.5 months. On the other hand the existence of two main annual cohorts, one autumm spawned and the other winter/spring spawned, have been mentioned by several authors in this area (5,6).

Due to the sampling technique, which is not the most appropiate for growth studies because it does not take into account the recruits neither the larger half part of the population in relation to the total length, these results can only be considered as provisionals. However, we think they are coherent enough to make clear the necessity of carrying out further studies in order to solve this question, because if this hypothesis was demonstrated as certain, it would change our understanding about the population dinamics of hake in the Mediterranean .
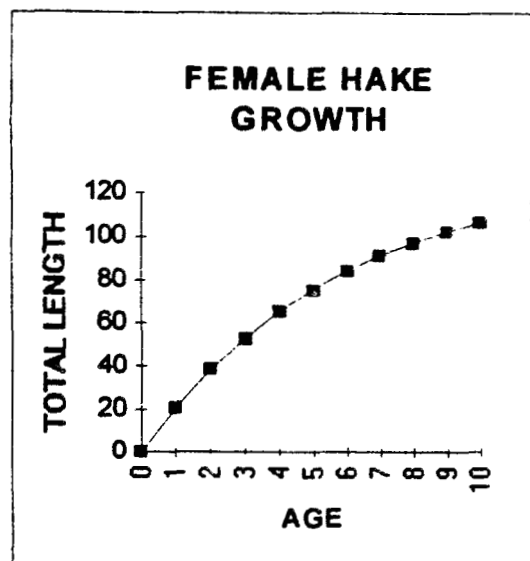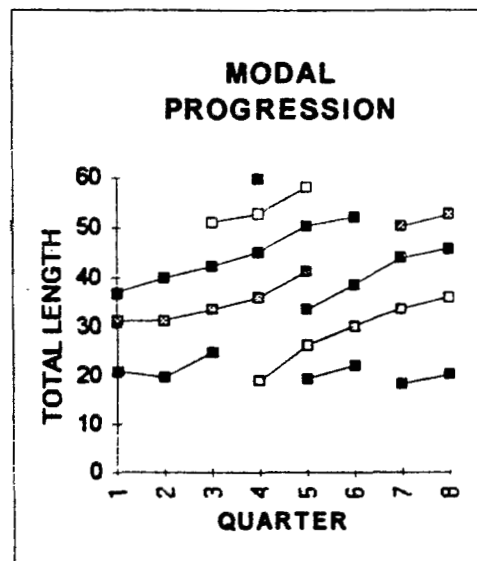

Figure 1.

Figure 2.

Paramet.	Estimate	Asymptotic Std Error	Coef.Variation
L.inf	126.9	45.70	0.360
K	0.184	0.094	0.514
To	0.035	0.146	4.089

Table 1.

References:
1-Oliver, P., F. Alvarez and B.Morales-Nin, 1990. FAO Rapport sur les pêches, 447:79-84.
2-Farrugio, H. et al., 1994. Comission of the EEC. Contract n° MA3-621. Final Report, February 1994.
3-Piñeiro, C. and J.A. Pereiro, 1993. ICES C.M. 1993/G 12.
4-Belloc, G., 1935. Rev. Trav. Off. Pêches marit., Nantes, 8 (2):145-202.
5-Bruno, J. et al., 1979. Rapp. P.V. Reun. CIESMM, 25/26 (10):79-8
6-Orsi-Relini, L, F.Fiorentino and M. Cappanera, 1986. Rapp.Comm.int.Mer Medit., 30 (2): 224.