Northwest Atlantic Fisheries Organization

Serial No. N2901 **NAFO SCR Doc. 97/67**

SCIENTIFIC COUNCIL MEETING - JUNE 1997

Essays on baking tecnique of Greenland halibut otoliths for ageing purposes.

by

M.L. Godinho and R. Alpoim

Instituto de Investigação das Pescas e do Mar
Av. Brasília, 1400 Lisboa, Portugal

In the sequence of an ICES recommendation during the 83rd Statutory Meeting in 1995, a Joint ICES/NAFO Workshop on Greenland halibut age reading occurred in Iceland from 26 - 29 November 1996.
According with the terms of reference, the ageing results of otoliths with different preparation techniques were compared in order to obtain information on the better techniques to improve resolution of the annual rings.
After analysis of the observed results some recommendations were made (ICES, 1997).
One of that recommendations refers to the need of conducting some "investigation into determining an optimal temperature and treatment time when baking otoliths for age determination purposes".

Following that recommendation 10 essays with different temperatures and time of baking were tried, as follows:

Essays	1	2	3	4	5	6	7	8	9	10
Temperatures (°C)	190	220	220	220	250	250	250	280	280	280
Time (min)	180	60	120	180	30	60	90	15	30	45

1 - Methodology

Otolith Preparation

For each essay ten paires of otolith (left and rigth) covering fish lengths between 40cm and 80cm were used.
Before baking the otoliths were soaked in a solution 50:50 of glycerin and thymol (10g dry thymol + 100g alcohol) during 48-72 hours in order to remove skins and other dirt that became burned during baking.

In order to enhance the acuity between annuli, the baked otoliths were wet with microscopic immersion oil for some time before observed.

Otoliths were observed using a stereomicroscope with reflected light, against a black background.

2 - Results

2.1 - What concerns enhancement of the annual rings it was concluded that the contrast between annual

rings benefit if the baked otoliths are kept wet in emmersion oil for at least 3 hours. Essays were made observing the same otolith immediately wet, 3 and 12 hours after. It was observed that resolution of the rings improves after 3 hours wet. Resolution after 12 hours wet did not show significant improvement relatively to 3 hours and in some cases rings can became more hyaline and loose acuity.

2.2 - In relation to the "baking act" it was concluded that, in general terms, the results observed for the different temperatures and times presents a high degree of variability, observed for the all range of fish lengths, probably related to the chemical composition of the individual otoliths. For the same length good and bad resolution was obtained for the different temperatures and times essayed.

Nevertheless, in general terms, the following preliminary conclusions can be refered:

i) Resolution between opaque and hyaline annual rings is better for 220° C / 60 min than 190° C /180 min.

ii) For the same 220°C resolution improves for 2-3 hours baking, relatively to 1 hour.

iii) When 250°C/30-60 min is used some otoliths younger than 6 years old show some improvement relatively to the 220°C/2-3 h because hyaline rings became more brown.
For the older ones improvement was observed for some ones but not for all of them.
If the baking time change from 60 min to 90 min some younger otoliths (less than age 6) can loose resolution but still some exceptions are observed.

iv) For the 280°C baking time, for any time, otoliths became extremely fragile and difficult of handle. In terms of acuity some improvement can be observed till age 10, mainly in the right otolith but for older ones again good and bad resolution is observed depending of the individual otolith composition. When 280°C/45 min. are used the small otoliths loose resolution (became almost all white) and clear benefit was generally not observed for the older ones (although some can look good).

3 - Conclusions

Although an evident variability of results was observed with in each essay it seems acceptable for the authors the following conclusions:

1. The use of the baking technique for Greenland halibut otoliths has advantage relatively to those untreated.

2. The use of some enhanced solution for an appropriate time (to be defined by the reader) improves the contrast between the opaque and hyaline rings.

3. The results obtained when using a baking temperature of 250°C/30-60 min. (depending of the size of the otoliths) appeared better than the ones obtained when 180°C, 220°C or 280°C are used.

4-Others conclusions

1. If resolution of both left and right otolith is compared, the right one shows frequently better contrast between annual rings. No differences in the age were observed between them.

2. For any temperature or time a strong dark brown ring can be observed, either for males (between the 6th-8th annual ring) or females (between 8th-10th annual ring). It is admitted that this clear ring sometimes doubled in some parts of the otolith, can correspond to the age when fish spawns for the first time .

3. The resolutions of the posterior part of the left otolith is usually more clear than the anterior part.

4. Older otoliths became frequently very thick in the posterior side after the "spawning ring" and loose resolution. In this situation two other parts of the otolith can help the ageing: i) the dorsal part for some ones or ii) the concave side for others.

5-Acknowledgments

The authors want to thanks the technicians Eduardo Santos and Domingos Correia for helping cleaning and baking the otoliths.

6-References

ICES, 1997. "Report of the ICES/NAFO workshop on Greenland halibut age determination". Reykjavik, Iceland .26-29 November 1996. ICES CM 1997/G:1