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# A method of estimating the total length of fresh herring on the basis of length measurements of thawed fish

by

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## INTRODUCTION

One of the basic elements of biological analysis is the length measurement of fish. This is carried out by a team of research workers on a fishing vessel. From the numerous papers presented at the ICNAF meetings it results that the number of collected data is unsufficient. Their increase meet with big difficulties. New solutions are searched in order to improve the present situation. One of them is thawing and measuring fish frozen aboard of vessels after their return from fishing ground. Fish to be frozen are chosen at random from the catch. During the freezing process the length of the fish diminishes. The use of frozen fish for biological analysis and length measurements requires that the magnitude of shrinkage of the fish be defined. By adding the calculated size of shrinkage to the length of the thawed fish, the length of the fresh fish before its freezing can be found.

The present paper presents an attempt to solve this problem for the herring caught during spawning time in the George's Bank fishing grounds.

## M a t e r i a l  a n d  m e t h o d

In October 1974, when carrying out research catches on B-20 "Wieczno" trawler in the George's Bank fishing ground two samples of herring were collected whose total amount reached 170 specimens. The measurements of total length /longitudo

totalis/ were done to the precision of 1 mm. The measured fish was sorted in one-centimetre length classes and then frozen and kept in fish holder during 5 months.

After this period of time of storing the fish was thawed and measured again to 1 mm precision. From the results of length measurements of the fresh and thawed fish, the mean lengths of fish in succesive length classes were estimated, and then plotted on the coordinate axis /Fig. 1, 2/. The correlation and the regression were calculated.

## Results of studies and discussion

From the data shown in table 1 it results that the correlation factor between the mean lengths of not frozen and thawed fish is 0.998 and the defined regression appears as a straight line equation:

$$y = -3.248 + 1.035$$

when: y = total length of the herring before frozing in mm.

x = total length of the herring after thawing in mm.

By means of this equation it is possible to define the total length of the herring before frozing if we have the length of the thawed fish given in mm.

The use of the millimetre scale in length measurements of fish is not practised in the actually applied research technique. That is why further discussions about this problem must take into consideration the measurement of fish length by the method employed in the ICNAF area and called the "1 cm below" method. Taking such an approach into consideration the data obtained from the length measurement of herring in millimetres have been grouped in one centimetre length-classes. In each length-class the mean, maximum and minimum lengths have been estimated separately for fresh and thawed herring. These data are shown in table 1 and in diagram 2. It results from these that the mean lengths of fish due to freezing shorten and shift to the neighbouring class lower

by 1 cm in comparison with the length of non frozen fish. The same concerns the minimum lengths of this fish. On the other hand the maximum length of thawed fish in most cases remains in the same length class in which the non frozen fish length was. Such a state of things is caused by the varied distribution of fish ~~sizes~~ within length-classes and by the relatively small decrease /an average of 7 mm/ in fish length ~~length~~ after thawing that is less than the class division ~~shows~~. The number of fish after defrosting which shift to the lower length classes /lower than those which contained the fish before freezing/ oscillated within the limits of 60% to 100%, with a mean value of 80% for all the classes /Table 1/. Using this mean index of shifting it is possible to estimated the initial number of non frozen fish within succesive one centimetre length-classes basing on distribution of fish within length-classes after thowing.

C o n c l u s i o n s

It is possible to increase the number of length measurements of herring by using fish frozen aboard of fishing vessels. Utilizing the above mentioned method we can reconstruct the length composition of herring catches by employing length measurements fish after thowing and assuming that the samples of frozen fish fulfil the requirements of representative samples. The discussed method of enriching information concerning the length composition of the stock cannot replace the methods used up to now which are based on measurements of non frozen fresh fish and can be considered as a complementary source only.

Table 1

**Mean values of the total length of herring before freezing and after defrosting**

| Class group | Mean length | | Length shrinkage | Numbers of fish shifted to the lower length class |
|---|---|---|---|---|
| | before freezing | after thawing | | |
| 27 | 273 | 266 | 7 | 100 |
| 28 | 284 | 379 | 5 | 70 |
| 29 | 294 | 288 | 6 | 80 |
| 30 | 303 | 295 | 8 | 80 |
| 31 | 314 | 305 | 9 | 70 |
| 32 | 322 | 317 | 8 | 60 |
| 33 | 334 | 327 | 7 | 90 |
| 34 | 344 | 335 | 9 | 100 |
| Mean | 308.8 | 301.5 | 7.3 | 80 |

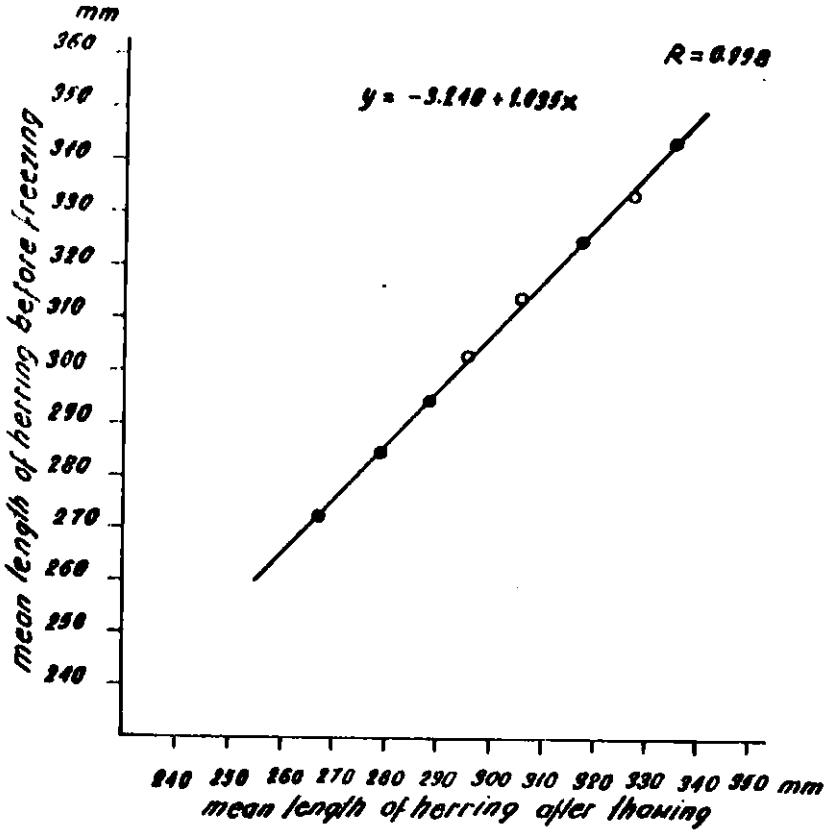


Fig. 1. Relation between total length of herring before freezing and after thawing

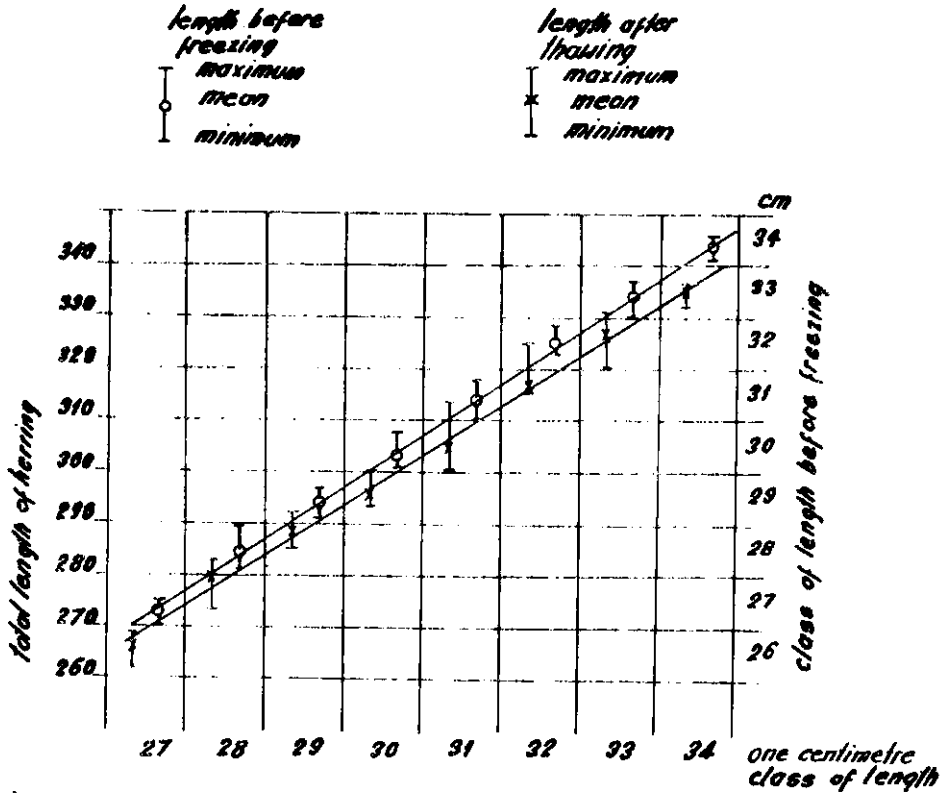


Fig. 2. Comparison of length of herring before freezing and after thawing