ICES Working Group Meeting on Fishing Technology and Fish Behaviour
Dublin, 24 - 26 April, 1989

HOW DO A ROUNDFISH EXPERIENCE A GIVEN "SCIENTIFIC" MESHSIZE?

by

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INTRODUCTION

During the last 30 years, numerous studies have been done to elucidate factors other than meshsize that affect size selection in trawls and Danish seine. This, with regard to the effect of twine material, selection factors have tended to fall in the order polyamid, polyester, polypropylene, polyetylene and manila (Pope et. al.1975). Looking closer into the knot strenght of these materials, one will find that they fall roughly into the same order. When constructing a codend with a given strength, the twine diameter consequently has to be increased in the same order as mentioned above, thus giving both thicker and more stiff bars as well as bigger knots. Selection factors have furthermore appeared to increase with mesh-size when the same type of material is used. The common practice is, however, to increase twine diameter with mesh size, and this tends to cancel out this effect (Pope op.cit.).

However, in the NE Atlantic one finds that while meshsize for a long time has remained the same, the twine diameter has increased steadily in spite of partly decreasing stocks and catchrates. Thus, presently in the Barents Sea the extremes of twine diameter used are double 3.1 mm twisted polyamid used by Soviet trawlers, and triple 5x10 mm hard-plaited polyamid used by Portuguese pareija-trawlers. When these two materials are measured by the ICES gauge or the flat wedge-shaped gauge and the same meshsize, will this technical measure fit the transvers section of a fish similarly in both cases? While a flatfish possibly will manage to "use" the whole mesh lumen in both materials to about the same extent, it is doubtful that a roundfish would do the same.

In order to elucidate this question, some samples of codend materials with different twine diameter were measured by the ICES-, the flat wedge-shaped and a home-made, cone-shaped gauge.

MATERIALS AND METHODS

Six samples of codend material were soaked in water for about two hours before they were measured by the two standard gauges, and by the cone gauge, which was made from wood with an elliptical transsection, with axis ratio 1:1.4 (Figure 1). The ICES-gauge was used with the recommended 4 kp load, the other two gauges with a 5 kp lead weight. The same five meshes of each sample were measured with the gauges when used in the same order as mentioned above.

RESULTS AND DISCUSSION

The results of the measurements are given in Table 1 and Figure 2. The samples are ranked according to twine diameter. The ICES-gauge (4 kp) mostly gave mesh sizes quite close to or just below the flat wedge-shaped gauge (5 kp) independant of twine diameter. On the other hand, compared with the flat gauge, the cone gauge measurements varied with twine diameter. If a lighter weight had been used these differences would probably have been even greater.

For samples 1-3 the cone gauge gave values below that of the flat gauge, while the samples 4-6 gave values above. The higher values for the light twines may be caused by prestretching from the former measurement, but it may as well be an effect of the special shape of the cone gauge.

For the meshsizes used in this experiment, a twine diameter of about 5 mm would seem to give about the same measure independant of gauges (Figure 2). When increasing the twine diameter to about 20 mm, the cone gauge measured meshsize is reduced by about 5 %, and the corresponding selection factor will decrease by the same relative amount. For smaller meshsizes the reduction will be even greater as the knot to bar relationship will become greater.

The reduction in estimated selection factor, just due to the lower mesh size measure given by a cone gauge, is not very dramatic. However, increased twine diameter gives thicker and stiffer bars, as well as bigger knots, and these may well have a direct effect on the escape behaviour of the fish, thus reducing the selection factor even more.

REFERENCES

Pope, J.A., A.R. Margetts, J.M. Hamley & E.F. Akyuiz, 1975. Manual of methods for fish stock assessment, part III. Selectivity of fishing gear. FAO Fish.Tech.Paper No. 41: 1-65.

Table 1. Measurements of codend materials with tree different gauges.

Sample no.	Twine diameter mm	Material	Nominal meshsize mm	ICES 4 kg mm	Flatwedge shaped mm	Cone elliptical shape mm	Difference Flat-cone gauge mm	%
1	3x10	PA-plaitted	135	133.4	133.6	127.2	- 6.4	- 4.7
2	2x5	PE-plaitted	130	128.5	131.8	128.7	- 3.1	- 2.3
3	2x4	PA-plaitted	135	134.2	134.8	132.6	- 2.2	1.6
4	1x3	PA-plaitted	130	130.0	131.8	133.4	1.6	1.2
5	1x2.5	PA-twisted	135	138.1	143.2	143.2	3.2	2.3
6	1x2.0	PA-twisted	115	120.1	124.6	124.6	3.8	3.1

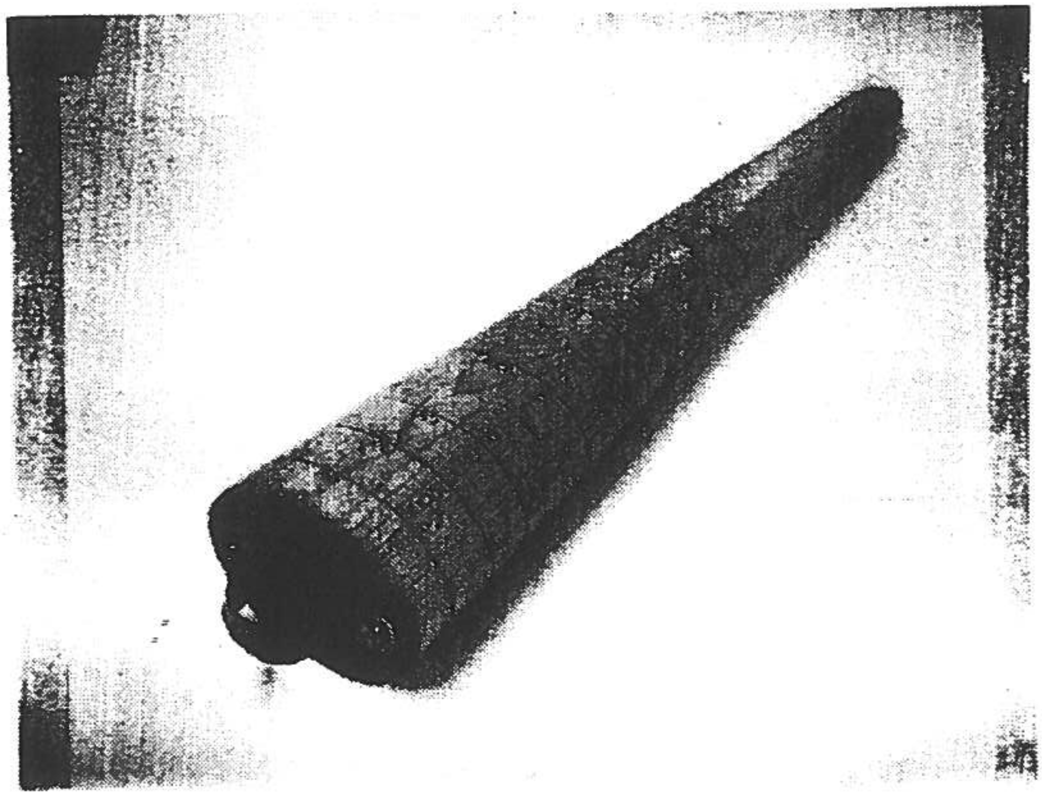


Figure 1. Wooden cone shaped gauge for mesh size measurements.

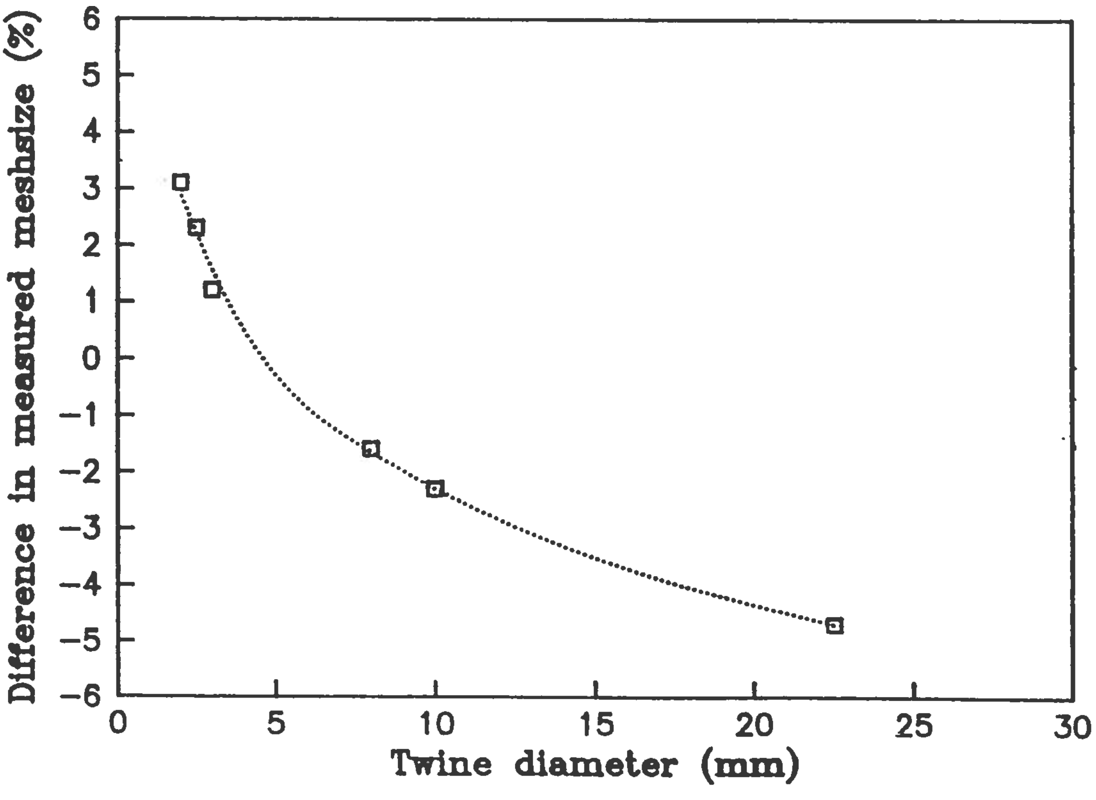
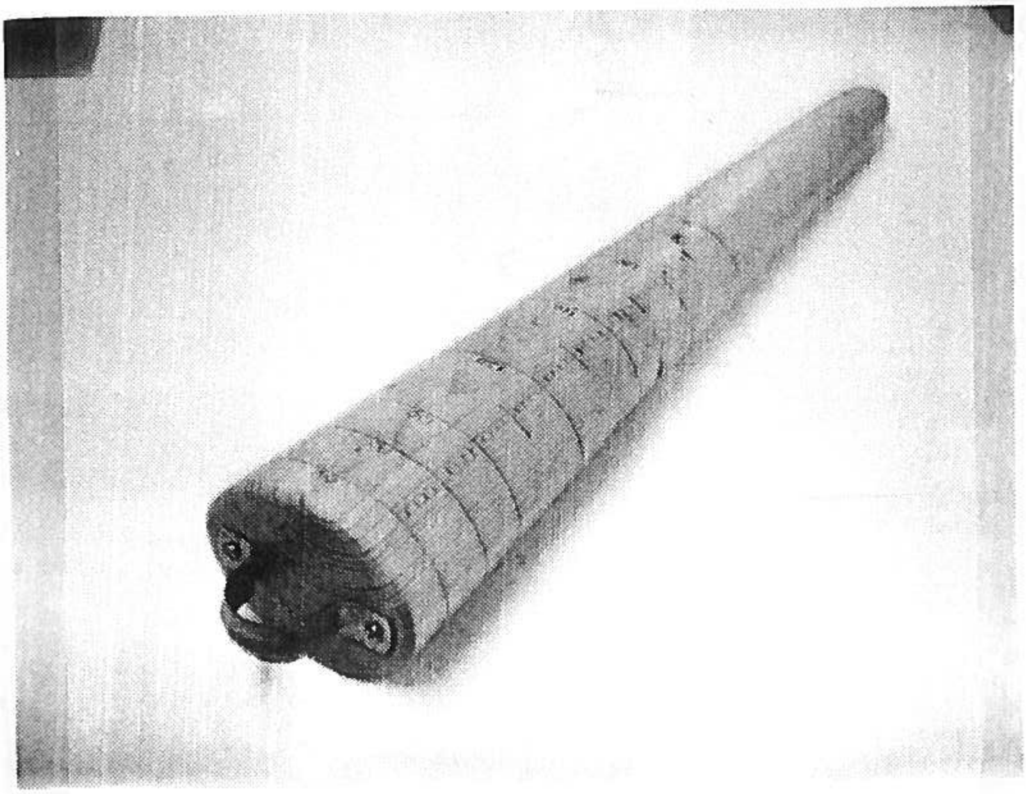


Figure 2. Difference in measured mesh size (%) as function of twine diameter when using a flat wedge shaped and a cone shaped gauge (5 Kp).



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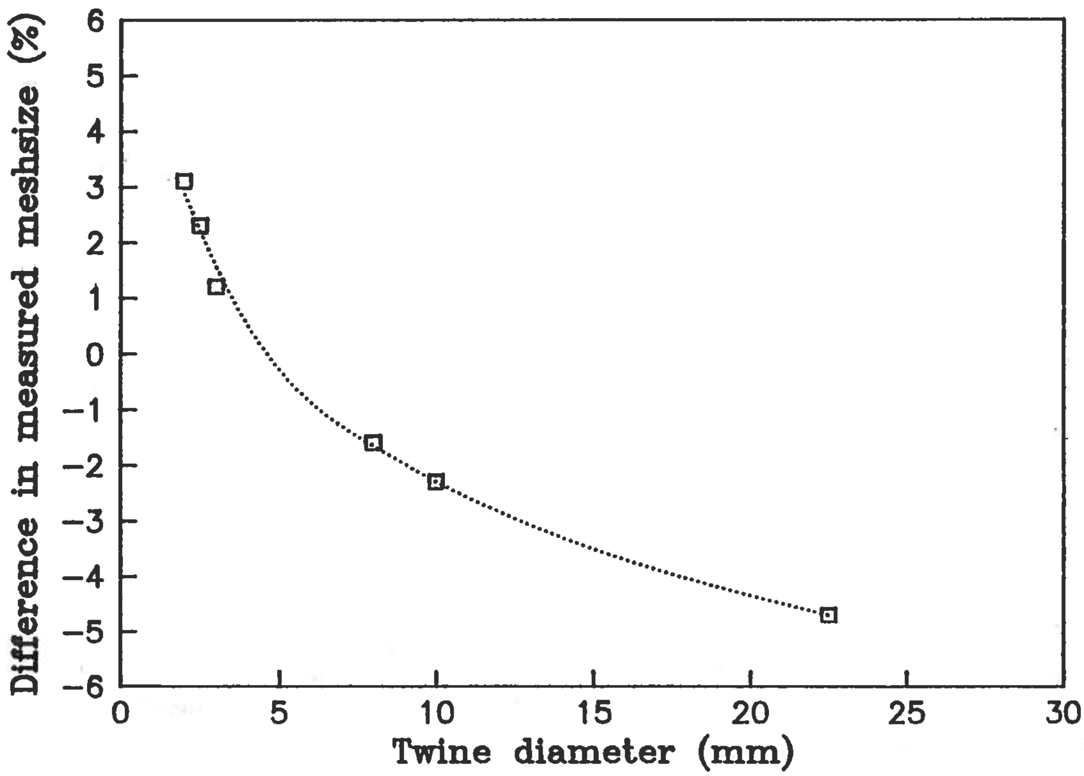

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