RESTRICTED

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

ICNAF Res.Doc.67/114

Serial No.1915
(D.c.8)

ANNUAL MEETING - JUNE 1967

Mesh Measurement Gauges and Methods of Applying Pressure

by

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Abstract

This experiment was done to show the significance of differences which exist in several methods of applying pressure using simple mesh measuring gauges. Several methods of applying pressure were tested: (1) spring loaded; (2) dead weight; and (3) personal estimation. The amount of pressure in two instances was twelve pounds (5.4 kg.), and in the third instance pressure was estimated.

The samples were taken from four codends. In the same codend there was greater variation between mesh sizes than between any of the three gauges. An over-all analysis of each of two types of netting was made. In each instance, the difference between gauges was not significant.

Introduction

A Working Group was established at the Commission's Sixteenth Annual Meeting in Madrid in June 1966, with the following terms of reference: "to study the whole question of mesh definition and method of measurement in the light of further discussion in NEAFC of international inspection arrangements with a view to further consideration being given at the Seventeenth Annual Meeting to the question of adopting a single gauge of uniform application which would be simple and satisfy scientists, inspectors, the courts, and the fishermen."

This experiment was made in the interest of resolving these questions. Two United States fisheries inspectors each having considerable experience in the field of law enforcement made the measurements. The primary thought was on inspection and enforcement of regulations - not research.

In the past numerous experiments have been conducted by scientists. The results, in about every instance, have been the same. In other words, the indications were that with careful use significant differences between average mesh measurement with each gauge are unlikely in spite of the difference in method of applying pressure to the gauges. It seems that great confusion has revolved about the precision of measurements taken from materials that are of questionable stability in the first instance. From the enforcement point of view, the prerequisite in a mesh measuring gauge is its legal acceptance, its ease of use and of transport.

The ICNAF Regulations define the type gauge to be used in testing mesh size and the amount of pressure to be applied. How this pressure is to be applied is left open for decision by the various user nations due to their individual legal acceptance problems. The ICNAF gauge itself is a standardized blade, is inexpensive, is easy to use, read and to transport. When netting of questionable mesh size is found, a high degree of prudence is used in alleging that a punishable violation has been committed. Due to the variances in mesh size found in netting while in use, and the variation in taking measurements from one inspector to another, there has to be a margin of sound discretion on the part of the investigator. This does away with the precision required by the scientist and places the allegation in a more acceptable light in the court of law. In general, when meshes are measured under different tensions, provided a minimum tension is applied and a maximum tension is not exceeded, mesh size is proportional to the tension applied. Therefore, from the international enforcement point of view, a trained inspector could apply his nation's method of measuring pressure on the international blade and if the average of the measurements were below the minimum in the acceptable margin of discretion the complaint by another nation would be valid and legal proceedings could be taken accordingly.

Experiment

It was decided that only persons with considerable previous experience, in using mesh measuring gauges, would take part in this experiment. These would be the men who would normally make investigations and who would make mesh measurements on the decks of trawlers at sea. They also are familiar with the types of codend twine being measured, in addition

to being familiar with the gauge in use. The only instructions issued were that the gauges were to be used as precisely as possible, and each of the two persons would measure all of the meshes in the row selected, parallel with the long axis of the codend approximately midway between the lacings, using first the spring loaded blade; second, the weighted blade; and third, the personal estimation. The measured pressures were 5.4 kg. including the weight of the gauge except the last which was assumed. Measurements were made on four different codend fabricated from #2 braided nylon (polyamide) cord, tex. no. 12,760, and four others fabricated from 3 mm nylon twisted cord, double, tex. no. 9,330. Due to the high strength of the cord in the meshes, the six measurements made on each mesh using the relatively low pressure had little or no effect on irreversible stretching of the twine and no effect on the knots as these were tightened hard through use. The netting was wet, soft, and flexible during the taking of measurements.

Measuring Gauge

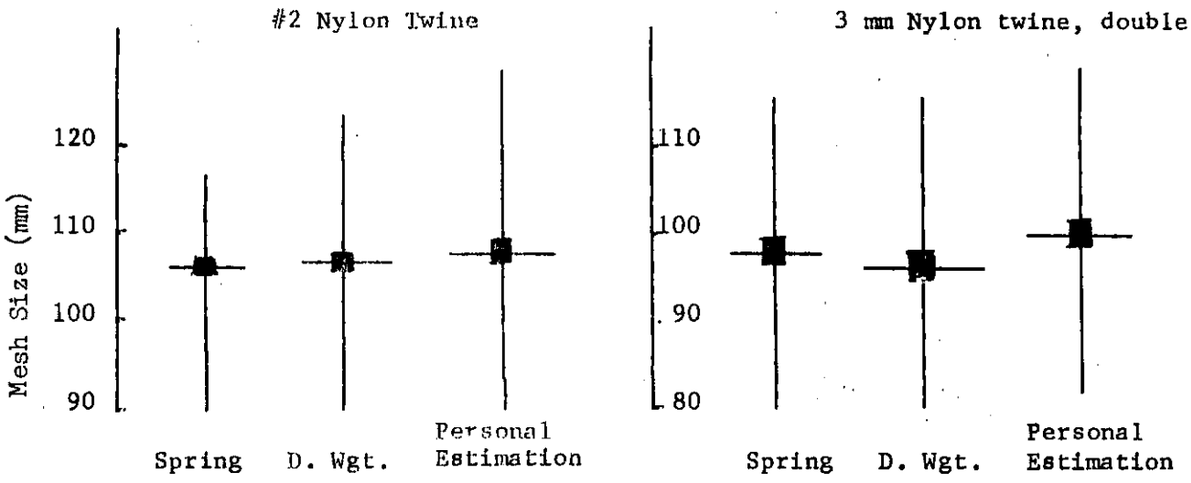
The gauges used were the simple plate type drawn to the specifications of the ICNAF Convention. The specifications being, flat wedge-shaped, having a taper of 2 cm in 8 cm and a thickness of 2.3 mm. This is the gauge that has been used in the United States for enforcement and research work (see diagram).

The method of applying measurable pressure is of individual choice. In this experiment the spring-load method approved by ICNAF was used, also the suspension of dead weight from the lower end of the blade, and simply personal estimation for testing.

The gauges used with measurable pressure were adjusted to include the weight of the blade.

Variances and S $\bar{X}$ of Pooled Samples by Method of Applying Pressure and Twine Type

	#2 Nylon Twine			3 mm Nylon Twine, double		
	Spring	D.Wgt.	P.E.	Spring	D.Wgt.	P.E.
N	186	186	186	196	196	196
$\bar{X}$	106.37	106.87	108.71	99.04	98.24	100.00
S^2	40.07	52.16	43.57	37.54	32.65	39.17
$S\bar{X}$	.469	.529	.480	.436	.412	.447
D*	± .938	± 1.058	± .959	± .872	± .824	± .894



*D = 2 $S\bar{X}$ (2 times the standard error of the mean). For example a range about the mean of 2 $S\bar{X}$ for the spring loaded gauge on #2 meshes will be 106.37 ± .94:L(+) = 107.31, L (-) = 105.43.

Conclusions

Numerous experiments have been made with several types of mesh measuring gauges by scientists from a number of nations throughout the world. The results of these experiments have been nearly the same, with the great emphasis on the lack of precision.

It would seem that for international enforcement purposes a high degree of precision is unnecessary. An inspector acting prudently would act within a margin of discretion. For legal purposes in this case the margin cannot be too narrow.

The problem should be approached with a philosophic point of view. All of the gauges that have been tested have inherent faults if they are not used cautiously. For purposes of international inspection the simple ICNAF gauge could be used for testing and when it is apparent that an infringement exists a more careful measuring of the meshes can be done the 5.4 kg weights attached. This method is slow and tedious, but there

are no springs or mechanical devices, the equipment is inexpensive, and probably acceptable by all courts as a method of measurement. In addition, the blade and the weights can be certified for width and for weight. Consideration should be given to acceptance of the ICNAF blade and this method of applying pressure during the interim to find a more expedient method.

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I.C.N.A.F. GAUGES

METHODS OF APPLYING PRESSURE

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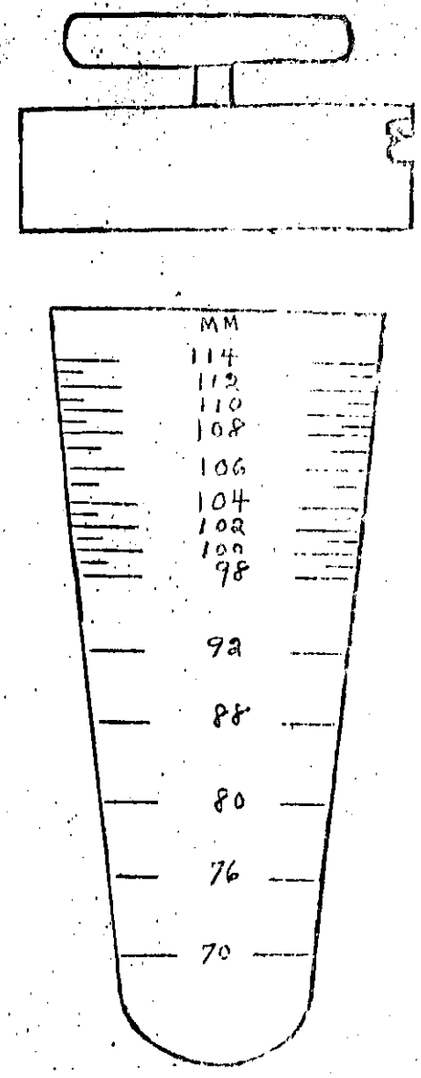

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