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DEFINITION AND TESTING OF LIGHT TRAWLS

A. R. Margetts

Recently the International Council has been asked by the Permanent Commission to provide data on the selectivity of light trawls as opposed to other trawls, information which will assist in defining light trawls as distinct from other trawls, and also proposals of methods of testing such trawls during inspection if that should be necessary.

This paper is concerned with the latter two points.

In the several experiments providing information about the comparative selectivity of so-called "light trawls" attention has been devoted exclusively to codend mesh selection. Whether the trawl as a whole (including groundropes, chains etc.) was light or heavy has not been associated with the results shown. Thus the term "light trawl", as commonly used hitherto and referred to by the Permanent Commission, is something of a misnomer in that what has been referred to is only the netting and not the other items of trawl gear. The experiments have all been framed in such a way as to compare codends made of sisal or manila, usually double-braided, with those made of cotton or hemp. The latter materials have usually been thinner and with greater runnage per unit weight than the sisal and manila, hence the netting made from them, especially when single braided, has been noticeably lighter than the sisal and manila.

Broadly, the comparison of sisal or manila codends with cotton or hemp codends is the only one made which assists in the scientific definition of a "light trawl". In one experiment showing cotton to have a higher selectivity than sisal the two materials were of almost the same runnage, while in another with single cotton much thinner than the double sisal the selectivities were little different. The effect of towing power and speed has scarcely been investigated although Boerema did find speed to have no real effect on the selection of dabs by hemp codends. Following the seine net experiments (Graham et al. and Lucas et al.) it was reasonably expected that trawl codends of thin flexible material would have higher selectivity than double sisal or manila codends; the thinner the material, for any internal gauge mesh size, the smaller would be the knots and the greater the length of twine between adjacent knots, thus making for more flexible netting. This would probably be influenced by treatment of twine. Some fine twines stretch more than other heavier twines so that a factor expected to affect selection, though perhaps only to a small extent, would be the stretching of twine due to towing force.

Thus, scientific definition of a "light trawl" must at present be limited, the term referring to a trawl made of cotton or hemp and not sisal or manila, with the expectation that single braided netting would have greater selectivity than double braided. And this definition may in the future have to be qualified with reference to various other factors such as twine dressing, the lay of the twine, and towing force, the effects of which are at present unknown.

In testing "light trawls" any test must be simple, not damage the gear, and be applicable under working conditions of the industry. The characters of twines and ropes which are measurable and are referred to in specifications are runnage, breaking strains and thickness; all three are directly related to the cross sectional area. Runnage is the more common means of specifying twines but this cannot be measured in netting.

Breaking strains are measured by breaking the twine and a special instrument would have to be devised to do the operation. Breaking strain is affected by treatment, knotting and age.

Thickness of twine can be measured without damaging the twine and also when the twine is in netting form. The two common methods of specifying thickness in twines and ropes are by circumference (usually ropes) and by diameter, although neither is commonly used in reference to fishing twines.

The methods of measuring diameter are by gauge or by external calipers (or micrometer). By any method a considerable number of observations must be made because twines vary in thickness along their length. The gauge will or will not at each gauge size let past the object to be measured; by testing with a variety of gauge sizes the actual size of the object can be fairly accurately determined. Such a gauge can be used for twines but is liable to very big errors due to the way that it is handled. To provide an at all accurate reading the twine must be let slide into the gauge with the minimum of force and no twisting. It is very easy indeed, especially if the twine is loosely laid and dry, to pass a twine through a gauge very much smaller than the true diameter of the twine. Due to its failure on this point alone, such a gauge cannot be recommended for testing netting. External calipers or micrometers are much more satisfactory and of these the micrometer is much the more suitable. A micrometer is simple to use and measures between flat surfaces so that the lay of the twine does not affect measurement. Apart from errors or variations introduced by the quality and nature of the twine being measured, the biggest error that can be introduced by a micrometer is that due to the pressure between the micrometer faces; this pressure can constrict the twine very considerably. But this error is removed if a standard face pressure is used, incorporated into the measuring by means of a ratchet adjustment; such ratchet adjustment is a common feature of good micrometers, and the ratchet pressure is usually specified in each country. Variations in thickness of a twine along its length will be caused by the type of material, the hardness of lay, the quality of the twine and the roughness of its usage. These factors should determine the number of individual measurements to be made in measuring the accurate average diameter. Expected variations in the average diameter would be caused by whether the twine was wet or dry, used or unused, treated (dressed) or untreated. The attached table indicates the type of result achieved with a micrometer with ratchet adjusted face pressure of $1\frac{1}{2}$-$2\frac{1}{4}$ lb. (British Standards Specification No. 870), - the type of micrometer which might well be used for testing "light trawls".

The need for and method of testing a net are secondary to the definition of a "light trawl". On the evidence so far available I would not feel confident that the selection by a big trawler using a cotton or hemp codend of smaller mesh was the same as that by a trawler using larger meshed double sisal or manila codends, especially if the cotton or hemp was braided double and treated with a dressing tending to decrease its flexibility. We have yet to seek a complete and satisfactory definition of a "light trawl".

Diameters of fishing twines as measured by micrometer with face pressure 1½-2¼ lb.

Material	Sisal		Sisal		Hemp		Hemp		Cotton		Cotton	
Runnage (yd./lb.)	150		112		150		-		-		-	
Treatment	Untreated		Untreated		Untreated		Tanned		Cuprinol		Cuprinol	
No. of measurements	27		27		23		30		30		30	
Condition	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Diameter range (1/1000 inch)	65-94	79-116	81-106	96-121	70-81	82-100	55-64	55-76	82-93	83-99	67-81	66-77
Mean Diameter (1/1000 inch)	81	97	91	107	76	92	59	66	87	91	72	71