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Selectivity of Codends with Various Types of Topside Chafers

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Various forms of topside chafers have been suggested to replace the "full skirt" of used codend used commonly by larger Canadian trawlers. Two suggestions have been to use (a) chafing gear of extra large mesh, and (b) short overlapping flap chafers. The latter possibility was first suggested to us by Captain Michelet of France in the winter of 1957. It has since been reported that a few British distant-water trawlers currently use this method (Beverton 1959) and some tests of its effect on codend selectivity have been reported by the same author.

The following paper reports the results of tests on types of topside chafing gear which included those mentioned above. Two of these experiments were carried out with the 107 ton research vessel "Harengus" during portions of two cruises, in September 1959 to the Sable Island Bank region, and in late October 1959 to the southwestern Gulf of St. Lawrence. The third series of tests was carried out with the 750 ton research vessel "A. T. Cameron" in the Emerald-Sable Island Banks region during a cruise in March 1960.

Methods

The covered-codend method of measuring selectivity was used throughout the tests. Fishing from the "Harengus" was carried out with a #36 manila trawl (headrope 60 feet); from the "A. T. Cameron" with a 41 manila trawl (headrope 79 feet). Codends and chafing pieces were all of double-strand, 75 yard, 4 ply, manila twine. Single-piece chafers were attached at their forward end across the width of the codend four codend meshes ahead of the splitting strap. They were fastened along the laceage (selvedge) and terminated four codend meshes ahead of the codline mesh. The varying widths and mesh sizes tested are tabulated below. All mesh measurements were made with the ICNAF type wedge gauge with pressure handle.

The flap-type chafer pieces were about eight meshes deep and the width of the laceage wider than the codend. They were attached along their forward edge across the codend, overlapped each other by about one mesh and the aft flap extended back to about 8 inches from the codline mesh.

The following groups of hauls were made:

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Series I: "Harengus", September 1959; predominant species haddock.

No. of tows	Codend mesh size		Topside chafer			Remarks
	in.	mm	Mesh size in.	mm	Width	
4	4 1/2	114	--	--		No chafer
4	4 5/8	117	5 1/16	128	Laceage wider	(by 8 meshes)
5	4 5/8	117	5 3/16	132	50% wider	
6	4 3/4	121	--	--		No chafer
6	4 3/4	121	5 3/16	132	50% wider	
4	4 3/4	121	--	--		No chafer
6	4 3/4	121	--	--		No chafer
6	4 3/4	121	5 1/8	130	Laceage wider	(by 8 meshes)

Series II: "Harengus", October 1959; predominant species cod.

5	4 1/2	115	--	--		No chafer
6	4 1/2	115	4 5/8	118	Laceage wider	(by 5 meshes)
4	4 1/2	115	--	--		No chafer
8	4 1/2	115	7	180	Laceage wider	(by 5 meshes)

Series III: "A. T. Cameron", March 1960; predominant species haddock.

14	4 3/8	112	--	--		No chafer
4	4 3/8	112	4 1/4	108	Flap chafer	
7	4 3/8	111	6 1/2	165	Laceage wider	(by 6 meshes)

Results

Haddock: The results for haddock are summarized in Table I, Series I and III. They show that for the sizes of catches encountered:

(1) Codend mesh selection for haddock is similar to earlier covered-net experiments. Selection factors ranged from 3.0 to 3.5 with a mean selection factor about 3.2.

(2) Chafing gear of about 3/8 to 1/2 inches larger than the codend mesh (about 5 1/8-inch chafers -- 4 3/4-inch codend) reduced escapement markedly when applied tightly.

(3) Chafing gear similar to that in (2) applied loosely, about 50% wider than the codend, did not reduce escapement appreciably.

(4) Chafing gear of mesh size about 2 inches larger than the mesh of the codend (about 6 1/2-inch chafer -- 4 3/8-inch codend) applied tightly, reduced the selection factor by only about 0.1.

(5) Flap-type chafing gear of slightly smaller mesh size than the codend gave results almost identical to (4). In both (4) and (5) the reduction is within the usual range of experimental variation.

In one instance chafing gear tightly applied reduced the selection factor for cod but did not affect the shape of the selection ogive. In another instance, the selection factor was reduced only slightly, but the selection ogive was materially flattened as shown by the wide range between 25 and 50% retention lengths.

Cod: Selection results for cod are summarized in Table I, Series II. Only a few cod were taken during the other experiments. Selection factors for cod from codends without topside chafers were about 3.3. Tight application of chafing gear of about the same size mesh as the codend (4 5/8-inch chafer -- 4 9/16-inch codend) and tight application for large-mesh chafers about 2½ inches larger mesh than the codend did not reduce the selection factor for cod nor alter the shape of the selection ogive.

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Table I. Topside chafing gear experiments, 1959-60.

Series I. 4½-4¾ inch (114-121 mm) mesh codend, haddock predominant.

No. of tows	Chafer	Catch: Approx. baskets all species	Catch: No. main species 30-50 cm	Retention length 25%	50%	75%	Selection factor
4	None	45	1400	31	34	36	3.0
4	5 1/16" mesh tight	90	3000	27	31	34	2.6
5	5 3/16" mesh loose	63	3500	32	36	40	3.1
6	None	85	5100	36	39	43	3.2
6	5 3/16" mesh loose	150	7800	35	39	43	3.2
4	None	35	2100	37	40	44	3.3
6	None	75	3700	40	42	46	3.5
6	5 1/8" mesh tight	70	3500	30	40	45	3.3
Series II. 4½ inch (115 mm) mesh codend, cod predominant.							
5	None	15	700	35	38	42	3.3
6	4 5/8" mesh tight	40	1500	35	38	42	3.3
4	None	35	1100	35	38	41	3.3
8	7" mesh tight	50	1443	36	40	43	3.5
Series III. 4 3/8 inch (111 mm) mesh codend, haddock predominant.							
9	None	115	1300	34	37	39	3.3
4	4 1/4" mesh flap type	55	1100	33	36	38	3.2
7	6 1/2" mesh tight	82	2200	33	36	38	3.2

Discussion

It appears that at the size of catches encountered in these experiments, loose topside chafers, large-mesh topside chafers and flap-type topside chafers had little effect on selectivity of the codend. Based on these experiments there was little to choose between the three types in relation to effect on selectivity (the flap-type chafer was not used extensively).

Tightly-applied chafing gear, of mesh size slightly larger than the codend, had no effect when catches of cod were small. The same chafer reduced escapement of haddock when catches were somewhat greater. No really large catches were made at any time during these experiments with topside chafers. It may be that extra large catches would cause the loose topside chafer to alter escapement. Large catches would seem less likely to affect selectivity results with large-mesh chafers or with flap-type chafers. Beverton (1959) presents some evidence to show that this is so for large-mesh flap-type chafers.

Various experiments have shown that selectivity of the codend is related to material, duration of haul and size of catch as well as other factors. The addition of topside chafers adds yet another complicating factor. From the experiments to date, the chafer likely to have least effect on escapement appears to be the flap-type pieces of netting with mesh size considerably larger than the codend.

Reference

Beverton, R.J.H. 1959. The selectivity of a modified form of topside chafer. Int. Council for Exploration of the Sea, Compar. Fish. Comm., Paper 117.