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The selectivity of codend with "Polish" chafer
made of 10 mm Stylon¹, for cod and redfish catches

by

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The first version of the Polish or large-mesh topside chafer was made of twine of the same thickness as that in the codend. In some cases such reinforcement of the codend was insufficient, particularly when the gear was hauled aboard up the stern chute with the heavy catch. Under the pressure of the bulk of fish the chafer sometimes broke. Therefore, the possibility of application of thicker twine for codend reinforcement has been considered. The chafer made of 10 mm cord seemed to give better protection to the codend and consequently it was necessary to investigate the effect of such reinforcement upon the selectivity of the gear.

I. Cod selection experiments

The investigations on selectivity were carried out in the period from 10 to 20 October 1967 in ICNAF Div. 3K (position 52°40'N, 53°23'W) during the cruise of R/V *Wieczno*. The measurements of the chafered codend used for experiments were as follows:

Length	-	170 meshes
Width	-	45 meshes
Wet mesh size	-	110.5 mm
Material	-	double Stylon twine 3.5 mm thick

The chafer - Polish type:

Length	-	45 meshes
Width	-	19 meshes
Wet mesh size	-	221.0 mm
Material	-	twisted Stylon cord 10.0 mm thick.

The netting of the chafer was knotless, which was achieved by passing one line at the mesh crossing between two strands of another one (Fig. 1).

The chafer was fastened to the codend along all its edges in such manner that one of its meshes stretched exactly over 4 meshes of the codend. For the selectivity experiments a piece of netting with 40 mm mesh was rigged over the upper part of the chafered codend. The mesh was measured with ICES gauge under the load of 4.0 kg. The measurements were performed along the codend, commencing at its end and included measuring of 50 meshes after each haul. Length measurements of fish were made separately of the cod retained in the codend and those which escaped into the selection cover.

In order to determine the selectivity 5 hauls were made, but only 2 of them could be considered successful. These 2 hauls provided material on the basis of which the selectivity has been determined. The particulars relating to the hauls and the data on gear construction are shown in Table 1. The data on cod retained in the codend and in the cover with 40 mm mesh are given in Table 2 and in Fig. 2. A total of 1,476 cod were captured. The selection factor was found to be 3.72

^{1/}
- Stylon = a polyamide fibre

In comparing the results obtained with those of previous investigations, one sees that the results of Strzyzewski's (1966) experiments with codend protected by Polish chafer gave a selection factor of 3.80, which is only slightly different, i.e. the obtained selection factor is lower by 0.08 (2.2%).

In Bohl's (1966) experiments carried out with a chafered codend of the same construction the selection factor was found to be 4.08 (?) - 3.91. It should be mentioned here that in the experiments carried out by Bohl with unprotected codend the obtained selection factor was 3.70, while in Strzyzewski's experiments, also with unprotected codend, this factor was found to be 3.92. The results of investigations carried out by Treschev (1966) showed that the selection factor for unprotected codends oscillated from 3.60 to 4.00 and for the codends reinforced with ICNAF chafing gear the value of this factor was 3.65, i.e. close to the minimum value of the selection factor for unprotected codend.

The application of the Polish type of chafer for reinforcement of codends seems, in view of the recent investigations, to have a negligible effect on the selectivity of the gear used for cod catches, even when such a chafer is made of thicker cord.

II. Redfish selection experiments

The observations on the selectivity of cod trawls used for redfish catches were carried out on 17 and 18 October 1967, on the fishing grounds in ICNAF Div.2J between 50°50'N and 51°00'W at a depth of 300-330 m.

To find the selection factor 3 hauls were made on 17 and 18 October 1967. Mesh measurements were performed in the same manner as described above for cod selection experiments. Fish measurements were carried out separately for males and females of redfish (Sebastes marinus) (Tables 3 and 4). As the result of the experiments, it was found that the selection factor was almost the same for both males (3.03) and females (2.98), the average being 3.01. So it was considerably higher than in the former investigations made by Treschev and Strzyzewski. The results obtained by them were as follows:

<u>Author</u>	<u>Codend</u>	<u>selection factor</u>
Treschev	unprotected	2.70
Strzyzewski	unprotected	2.85
Strzyzewski	unprotected	2.31
Treschev	protected	2.70
Strzyzewski	protected	2.92

Thus, we see that the codends with mesh size 110.5 mm reinforced with chafer of Polish type, made of 10 mm Stylon, will select 50% of redfish of length 33.5 cm (female 33.0 cm, male 33.5 cm).

Summarizing the results of cod and redfish selection experiments, we find that the selectivity of codends reinforced with topside chafers of the Polish or large-mesh type, even when the latter are made of thicker cord, remains unimpaired.

References

- Bohl, H. 1967. Selection experiments with large-meshed topside chafer. ICNAF Redbook 1967, Part III, p. 82-89.
- Strzyzewski, W. 1966. The effect of the use of chafing gear on selection factor. ICNAF Redbook 1966, Part III, p. 112-121.
- Treschev, A. 1966. The effect of chafers on selectivity, strength and durability of trawls. ICNAF Redbook 1966, Part III, p. 132-141.

Table 1. Selection data for cod and redfish, 1967. Commercial trawl net with Polish-type chafer of thick twine material.

Vessel	R/V <i>Wieczno</i> , length 61.2 m, 1,375 HP		
Species	Cod	Redfish	
Date	19-20 Oct 1967	17-18 Oct 1967	
Time	1845-2140 (dark), 0030-0530 (dark)	0615-0815 (light), 0730-0930 (light)	
Geog. position	Div. 3K (52°40'N; 53°23'W)	Div. 2J (50°50'N; 51°00'W)	
Depth	370-260 m; 230-360 m	330-300 m	
Method of Investigation	Topside cover		
<u>Cover</u>	ICES specifications		
Material	Stylon		
Runnage (m/kg)	1,143		
Tex	29 tex x 10 x 3		
Braiding	Single		
Twist	Triple		
Mesh lumen (mm)	40		
<u>Codend</u>			
Material	Stylon		
Runnage (m/kg)	133		
R tex	R7500 tex		
Braiding	double		
Twist	triple		
<u>Chafer</u>	Polish type		
Material	Stylon		
Runnage (m/kg)	21		
R tex	R 47 000 tex		
Braiding	double		
Twist	triple		
Number of hauls	2	3	
Trawling time (min)	175-300	175-300	
Trawling speed (knots)	3.5-4.0	3.5-4.0	
Mesh gauge	ICES	ICES	
Codend mesh size (mm)	110.5 ± 0.2	110.5 ± 0.2	
Range (mm)	106-122	106-122	
No. measurements	50	50	
Chafer mesh size (mm)	222	222	
25-75% selection range (cm)	10.7	♂ 14.9	♀ 7.8
No of fish in cover	379	219	238
" " " in codend	1,097	297	1,172
50% retention length (mm)	410	335	330
Selection factor	3.71	3.03	2.98
			♂♀ 14.3
			457
			1,469
			333
			3.01

Table 2. Size distribution of cod captured in the codend and cover with "Polish" chafer.

Fish Length (cm)	No of fish			Retention (smoothed) (%)
	in codend	in cover	total	
29	1	2	3	19.0
30	1	3	4	19.1
31	-	2	2	19.0
32	2	4	6	20.6
33	3	7	10	34.0
34	6	6	12	34.1
35	11	23	34	40.8
36	19	28	47	38.4
37	37	49	86	42.1
38	38	47	85	46.0
39	41	39	80	47.1
40	44	48	92	49.0
41	37	38	75	49.7
42	40	35	75	62.7
43	80	13	93	75.0
44	69	11	80	83.3
45	56	11	67	85.3
46	48	4	52	86.0
47	52	7	59	91.7
48	42	2	44	94.1
49	28	-	28	98.3
50	33	-	33	100.0
51 and larger	409	-	409	100.0
Total	1,097	379	1,476	-

Table 3. Size distribution of male and female redfish captured in the codend and cover with "Polish" chafer.

Fish Length (cm)	No of fish						Retention (smoothed) (%)	
	in codend		in cover		total		♂	♀
	♂	♀	♂	♀	♂	♀		
22		1		1		2		16.6
23	1	-	2	1	3	1	11.1	16.6
24	-	1	1	-	1	1	33.3	16.6
25	2	1	1	1	3	2	34.7	16.6
26	3	-	5	4	8	4	48.9	16.6
27	6	-	8	8	14	8	38.6	8.4
28	5	2	9	6	14	8	33.5	18.5
29	4	4	14	9	18	13	27.1	33.1
30	4	7	13	9	17	16	26.3	40.6
31	8	10	16	11	24	21	30.7	49.0
32	11	24	20	19	31	43	37.2	46.2
33	19	17	25	31	44	48	45.7	49.6
34	27	37	19	27	46	64	55.0	53.2
35	47	54	27	27	74	81	61.3	65.7
36	36	43	22	16	58	59	65.2	74.4
37	47	52	20	10	67	62	68.3	78.0
38	35	55	13	16	48	71	75.6	81.6
39	21	67	4	13	25	80	85.6	87.7
40	11	92	-	10	11	102	94.6	88.6
41 and larger	10	94	-	8	10	102	100.0	93.0
42		123		4		127		95.5
43		132		3		135		97.8
44		115		1		116		98.3
45		105		2		107		98.4
46		57		1		58		98.7
47 and larger		79		-		79		100.0
Total	297	1,172	219	238	516	1,410	-	-

Table 4. The length of redfish captured in the codend with "Polish" chafer (males and females combined).

Fish Length (cm)	No of fish			Retention (smoothed) (%)
	in codend	in cover	total	
22	1	1	2	8.3
23	1	3	4	25.0
24	1	1	2	45.0
25	3	2	5	45.0
26	3	9	12	37.4
27	6	16	22	28.0
28	7	15	22	28.2
29	8	23	31	30.3
30	11	22	33	33.0
31	18	27	45	40.1
32	35	39	74	42.1
33	36	56	92	48.1
34	64	46	110	54.1
35	101	54	155	63.5
36	79	38	117	69.7
37	99	30	129	73.2
38	90	29	119	78.7
39	88	17	105	83.5
40	103	10	113	89.1
41	100	8	108	93.4
42	124	4	128	95.7
43	134	3	137	97.9
44	116	1	117	98.3
45	105	2	107	98.4
46	57	1	58	98.7
47	51	-	51	99.4
48 and larger	28	-	28	100.0
Total	1,469	457	1,926	-

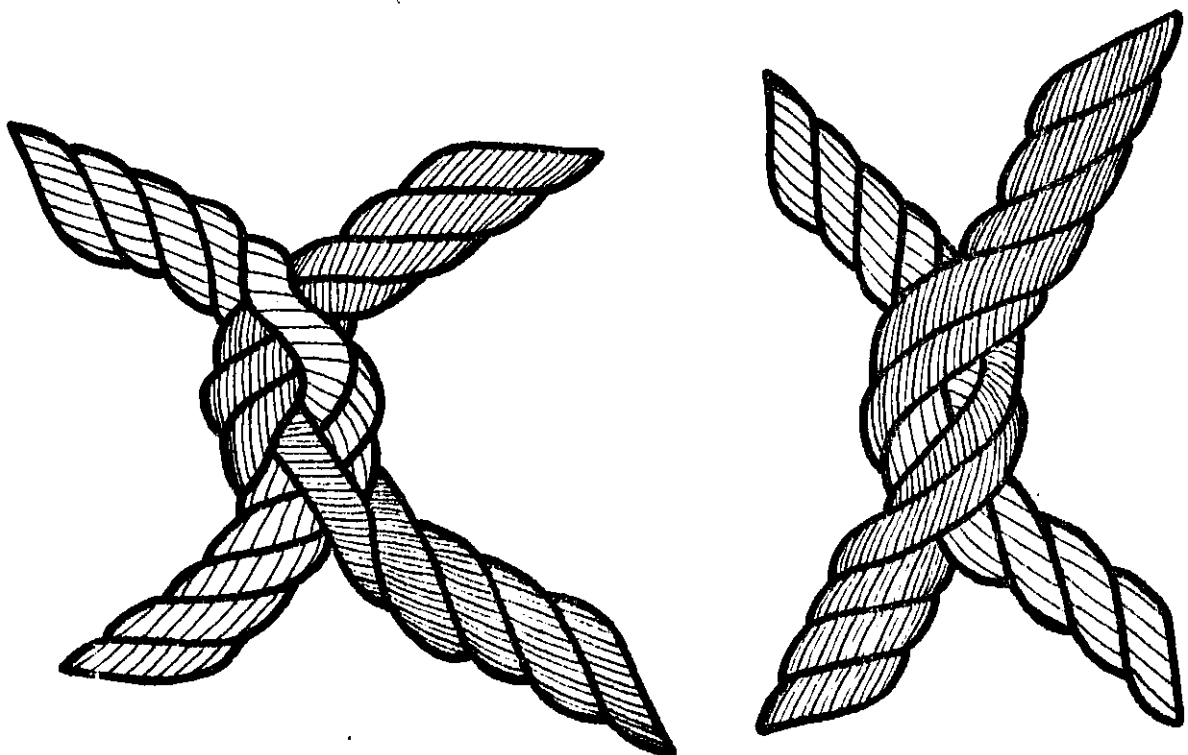


Fig.1 The manner of twisting mesh in the chafer

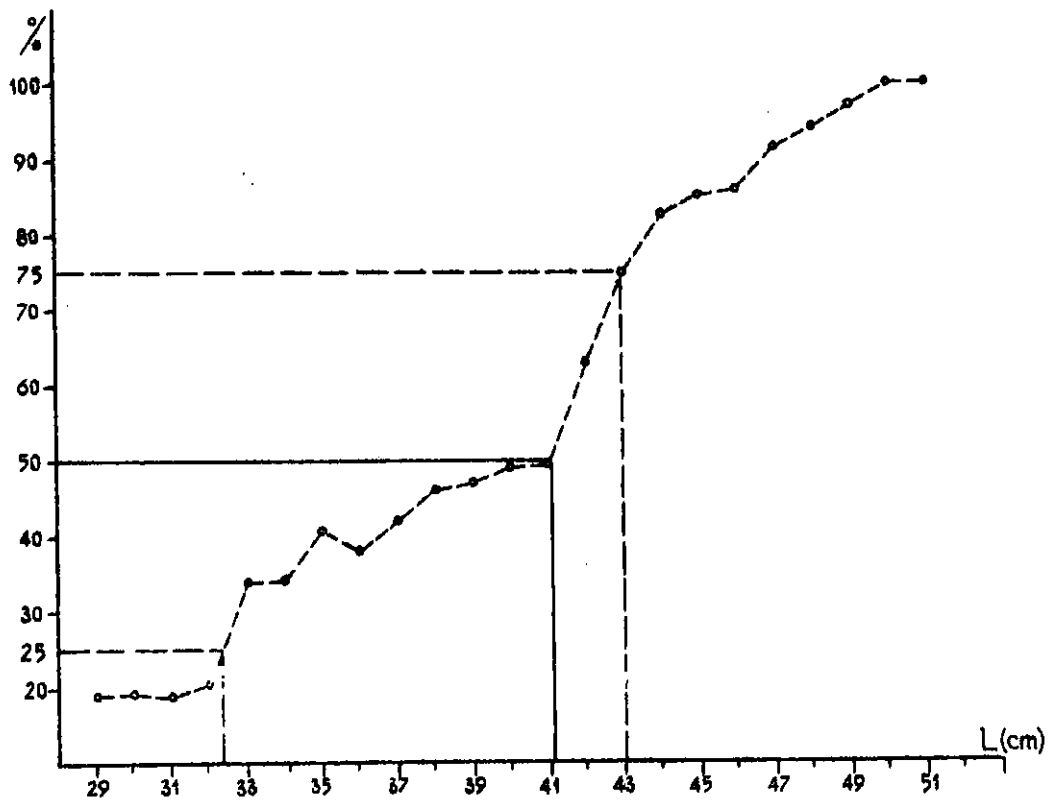


Fig. 2 Selection factor for cod in the codend protected with Polish chafer

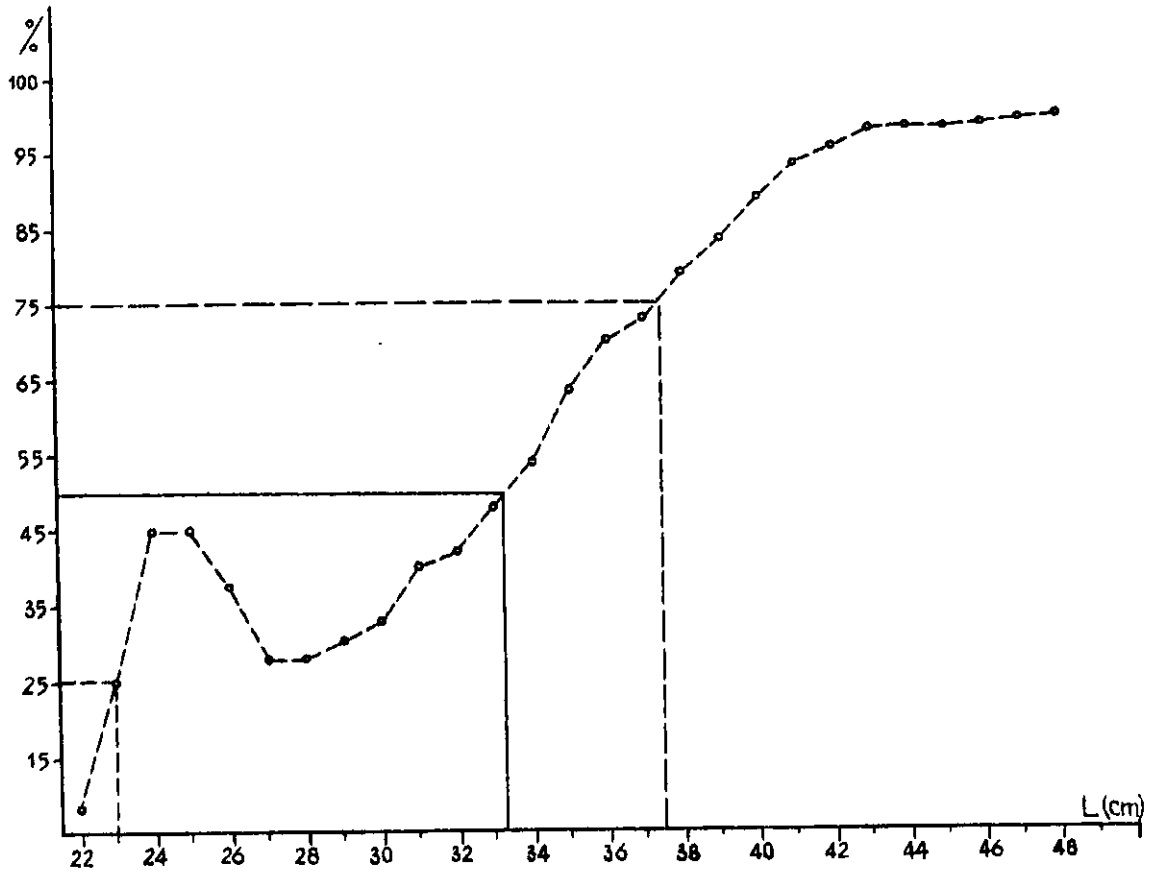


Fig. 3 Selection factor for redfish in the codend protected with Polish chafer