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**CATCH COMPARISON BETWEEN ROCKHOPPERS AND BOBBINS GROUND
GEAR ON THE NORWEGIAN BOTTOM SAMPLING TRAWL**

by

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ABSTRACT

In a study aimed at improving the reliability of the Norwegian bottom sampling trawl, comparative fishing between standard bobbins gear and rockhopper ground gear were carried out in the Barents Sea. The catch ratios bobbins/ rockhopper (B/R) for cod and haddock show a higher efficiency for rockhopper than for bobbins, especially for small fish. The catch ratio B/R for cod varied by time of day. Rockhopper seemed to have a higher efficiency compared to bobbins during daytime. The same trend was not found for haddock. These experiments confirm earlier experiments that rockhopper is more effective than bobbins gear in catching fish close to the bottom. This is particularly true for small cod.

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INTRODUCTION

Stock assessments of North-East Arctic cod and haddock are mainly based on the results from combined acoustic and bottom trawl surveys (Anon. 1988). The basic requirements of the bottom trawl survey are that each trawl catch should provide a representative estimate of the density ratios of cod and haddock over the entire length range and that the length distributions obtained are correct.

The results from the bottom trawl surveys have shown that the young fish have been considerably underestimated (Hysten, Nakken and Sunnanå, 1986). This effects the acoustic estimate in the same manner because the length compositions from the trawl catches are used in converting echo abundance to fish density in the acoustic survey.

Experiments in 1985 and 1986 (Engås & Godø, 1987) with bags under the trawl showed a very high escapement of small cod and haddock under the fishing line. Preliminary investigations with a rockhopper gear indicated that this was more effective than a bobbins gear for catching fish close to the bottom, especially small fish. Based on these results it was decided to investigate the efficiency of the rockhopper more closely for both cod and haddock in different depths during different times of the day.

MATERIALS AND METHODS

Comparative fishing trials with standard bobbins gear and rockhopper gear was carried out in the Barents Sea with M/Tr "T.O. Senior" (46.5 m - 1650 HP) and R/V "Michael Sars" (45.7 m - 1500 HP) in February 1988. The experiments were carried out in two different areas, with a depth of approximately 350 m and 260 m (mentioned later as area 1 and 2, respectively).

Table 1 lists the number of hauls made by the two vessels in area 1 and 2.

The standard Norwegian sampling trawl for bottom fish and shrimp in the Barents Sea and Svalbard areas was used. The specifications of the two ground gear are given in Fig. 1. Both vessels used 6.4 m Vee-doors. Headline height and door-spread were measured with acoustic trawl instruments on both vessels.

All results are from parallel fishing with vessels approximately 2 cables apart. The duration of tow was 1/2 hour at a speed of 3 knots (Doppler-log). Tows were made day and night.

Sampling and measurements of the trawl catches were performed as during routine surveys in the Barents Sea, i.e., the species composition and length distribution were determined by sorting/measuring either the total catch or a representative sample. The fish length was measured to the nearest centimetre below.

RESULTS

Trawl dimensions

The measurements of the trawl dimensions showed a slightly higher door-spread with bobbins than with rockhopper ground gear (Table 2). No difference in vertical opening was observed.

Catch comparison

Tables 3 and 4 show the bobbins and rockhopper catches of cod by numbers distributed in length groups from area 1 and 2, respectively. The catch ratio bobbins/rockhopper (B/R) is given for each length group. The corresponding results for

haddock are given in Tables 5 and 6.

The catch ratio, B/R, for cod in both areas shows that the rockhopper has a higher efficiency than bobbins, especially for small fish. The pooled catches from the two areas give a B/R ratio of 0.45 for cod below 35 cm and 0.64 for cod above 35 cm. The corresponding results for haddock show an even greater difference in the B/R ratio for fish less than 20 cm (B/R= 0.22) and fish above that size (B/R=0.85).

From comparing the catch ratio, B/R, for the total catch of cod in each haul at different times of day (Fig. 2), it appears that the higher efficiency of the rockhopper is greatest during daytime, especially in area 1. Such differences were not found for haddock (Fig. 3).

DISCUSSION

These experiments confirm results of earlier experiments (Engås and Godø, 1987), and show that rockhopper is more effective than bobbins gear in catching fish close to the bottom, especially small cod and haddock.

Direct observations of fish in front of a bobbins gear in daylight have shown that fish in many cases actively search for openings between the fishing line and the bottom (unpubl. results). Observations have also shown that with a rockhopper gear, in contrast to a bobbins gear, the spaces between and behind the rubber discs are filled with a sand cloud, especially in the the wingpart. This may prevent fish from escaping.

This may also explain that the catch ratio, B/R, for cod seemed to be lower by day than by night. At low light levels, the fish should have difficulties to detect openings between

the fishing line and the bottom.

It should also be mentioned that the rockhopper used in these experiments is approximately 100 kg heavier than the bobbins gear and this will give better bottom contact.

The abundance indices from the Barents Sea in February show that cod of age 1, 2 and 3 are underestimated compared to older fish (Hysten, Nakken and Sunnanå, 1986). Assuming that cod of length 10-19 cm, 20-34 cm and 35-49 cm are 1, 2 and 3 years, respectively, the experiments in the present study imply that only 30 %, 46 % and 63 % of these age groups are caught by the trawl equipped with bobbins gear compared to the catch with the rockhopper gear. The corresponding results for haddock are 22 %, 91 % and 81 %.

Due to the species difference in the catch ratios, B/R, escapement of fish under the trawl also influences the species composition. The cod/haddock ratio increases from 0.20 with bobbins to 0.28 with rockhopper (pooled catches, all length groups).

These results show fairly good agreement with earlier results with bags and rockhopper (Engås and Godø, 1987), except for the smallest length group of both species. The catch ratio, B/R, for small fish (< 20 cm) are far higher in these experiments, but unfortunately, very few small fish were caught.

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Hyllen, A., Nakken, O. and Sunnanå, K. 1986. The use of acoustic and bottom trawl surveys in the assessment of North-East Arctic cod and haddock stocks. Pp 437-498 in Alton, M. (ed): A Workshop on Comparative Biology, Assessment, and Management of Gadoids from the North Pacific and Atlantic Oceans. Seattle, Washington, 1986.

Table 1. Breakdown of experiments by vessel and are.

Figures in brackets are; (B) = bobbins, (R) = rockhopper

Area	Vessels	Number of haul
1	T.O. Senior	7(R) - 9(B)
1	M. Sars	7(B) - 9(R)
2	T.O. Senior	4(B) - 5(R)
2	M. Sars	4(R) - 5(B)

Table 2. Measurements of trawl height and door spread.

	Height (m)	Door-spread (m)
Bobbins	3.7 - 4.2	57 - 64
Rockhopper	3.7 - 4.2	59 - 66

Table 3. Ground gear comparison area 1. Catch of cod in numbers by length and catch ratios bobbins/rockhopper (B/R).

<u>Length group</u>	<u>Bobbins</u>	<u>Rockhopper</u>	<u>B/R</u>
10 - 14	-	2	
15 - 19	-	2	
20 - 24	15	41	0.37
25 - 29	59	147	0.40
30 - 34	127	265	0.48
35 - 39	206	386	0.53
40 - 44	598	892	0.67
45 - 49	693	1161	0.60
50 - 54	379	579	0.65
55 - 59	167	207	0.81
60 - 64	44	81	0.54
65 - 69	41	45	0.91
70 - 74	23	49	0.47
75 - 79	26	30	0.87
> 80	24	49	0.49
Σ	2402	3936	0.61

Table 4. Ground gear comparison area 2. Catch of cod in numbers by length and catch ratios bobbins/rockhopper (B/R).

Length group	Bobbins	Rockhopper	B/R
10 - 14	2	3	0.67
15 - 19	1	3	0.33
20 - 24	9	29	0.31
25 - 29	57	105	0.54
30 - 34	67	146	0.46
35 - 39	104	140	0.74
40 - 44	273	433	0.63
45 - 49	349	506	0.69
50 - 54	245	370	0.66
55 - 59	102	158	0.65
60 - 64	34	47	0.72
65 - 69	14	26	0.54
70 - 74	5	15	0.33
75 - 79	8	6	1.33
> 80	19	22	0.86
Σ	1289	2009	0.64

Table 5. Ground gear comparison area 1. Catch of haddock in numbers by length and catch ratios bobbins/rockhopper (B/R).

Length group	Bobbins	Rockhopper	B/R
10 - 14	2	35	0.06
15 - 19	1	21	0.05
20 - 24	37	53	0.70
25 - 29	293	317	0.92
30 - 34	1317	1358	0.97
35 - 39	4308	4350	0.99
40 - 44	6663	7857	0.85
45 - 49	2382	3331	0.72
> 50	604	963	0.63
Σ	15608	18285	0.85

Table 6. Ground gear comparison area 2. Catch of haddock in numbers by length and catch ratios bobbins/rockhopper (B/R).

Length group	Bobbins	Rockhopper	B/R
10 - 14	9	15	0.60
15 - 19	7	15	0.47
20 - 24	43	64	0.67
25 - 29	106	151	0.70
30 - 34	299	363	0.82
35 - 39	662	758	0.87
40 - 44	928	1151	0.81
45 - 49	428	519	0.82
> 50	189	218	0.87
Σ	2671	3254	0.82

BOTTOM SURVEY TRAWL CAMPJEL 1800

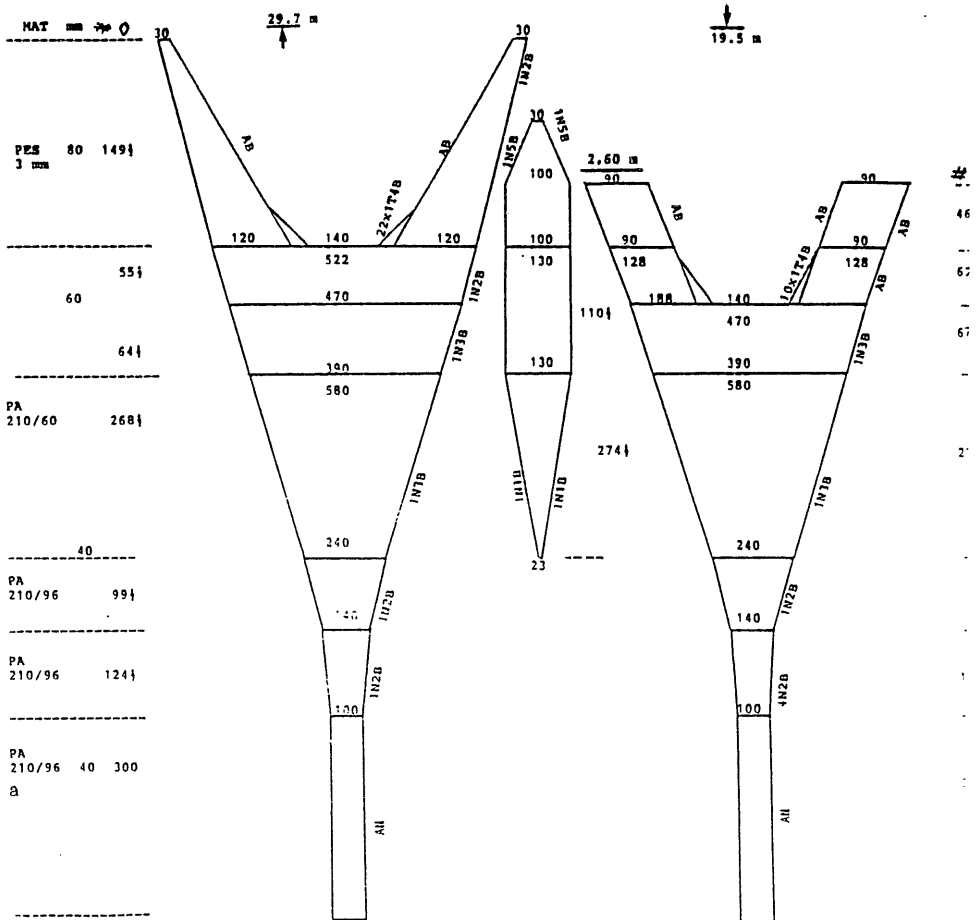


Fig. 1. Bottom survey trawl Campjelen 1800.

Headline floats 90 x 200 mm

- a) Groundgear: Bobbins (rubber) with plastic spacers
 Bosom: 3 x 457 mm cylindrical and 1 x 457 mm half shape at ends
 Wings: 6 x 457 mm half shape and 4 x 356 mm half shape at ends
- b) Groundgear: Rockhopper (rubber) with steel and rubber spacers
 Bosom: 24 x 356 mm rubberdiscs
 Wings: 96 x 356 mm rubberdiscs

Fol. 41B

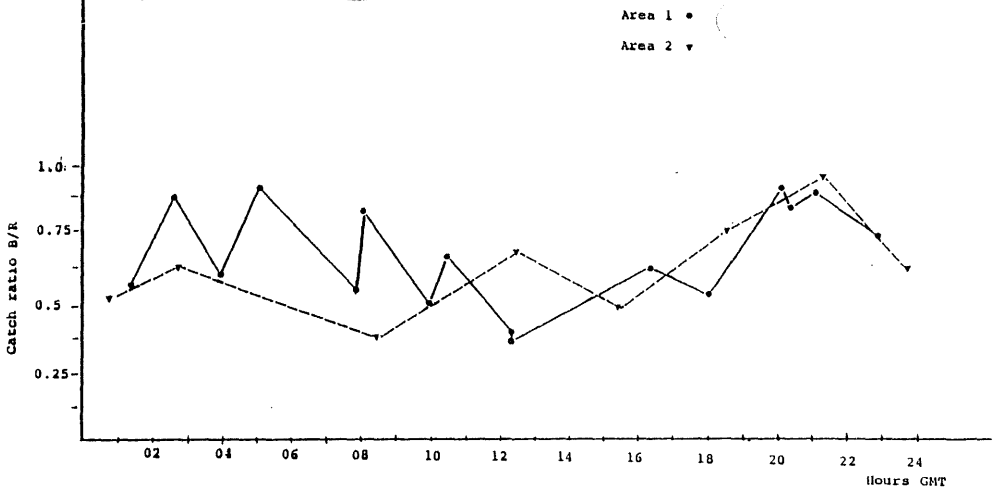


Figure 2. Cod. Catch ratio (Bobbins/Rockhopper) for all length groups in each haul during the day.

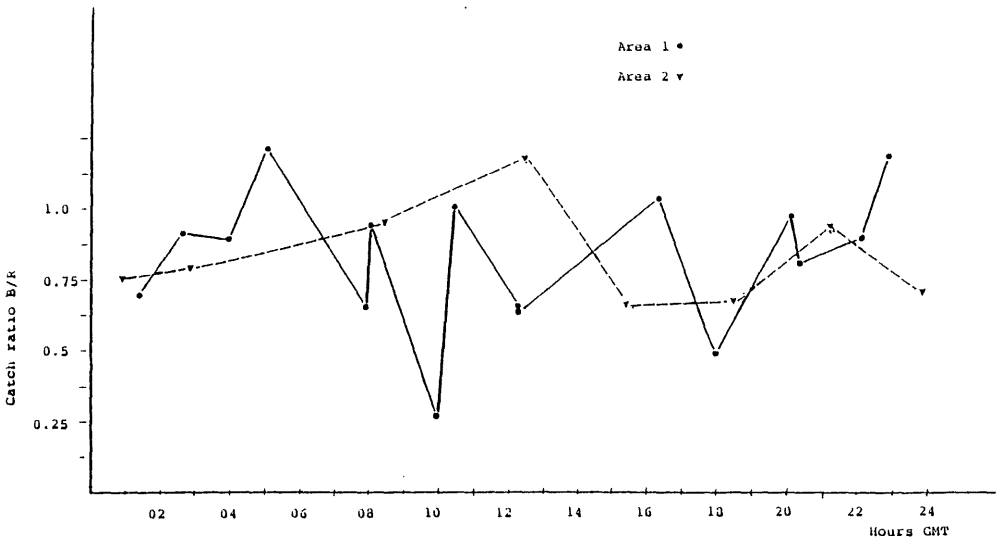


Figure 3. Haddock. Catch ratio (Bobbins/Rockhopper) for all length groups in each haul during the day.