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Improved catch rates and selection of Norway lobster (*Nephrops norvegicus* L.) by controlled release of fluid bait extract in pot fishing

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ABSTRACT

The effect of controlled release of fluid mackerel extract as bait in Norway lobster pots was tested in comparative fishing trials. Compared with natural mackerel bait, pots with extract release rates above 6 ml/h had higher catch rates than mackerel baited pots. There was no significant difference in length distribution of Norway lobsters between the two types of bait.

INTRODUCTION

In previous comparative fishing trials with Norway lobster pots, an aqueous extract of mackerel was tested against traditional mackerel bait. The catch rate of the traditional bait was three times that of the extract and the Norway lobsters caught by the extract baited pots were also significantly smaller (Bjordal et al., 1991). It was suggested that the differences in catch rate and size selectivity were caused by lower release rates of attractants from the extract tubes than from the traditional bait, as the release was based on passive diffusion through holes in the tubes. It was concluded that controlled release of extract was needed to test the effect of fluid bait. A device for controlled release of fluid bait extracts was constructed and tested in the present study.

MATERIALS AND METHODS

Frozen mackerel was obtained for bait. It was partly used as natural bait and partly for making extract. To make the bait extract, 29 kgs of whole mackerel was chopped, mixed with an equal amount of water, squeezed and centrifugated, giving 20 l of water soluable extract, which contained 4.4% dry matter.

The pots were either baited with five pieces of mackerel (115 g) in perforated 500 ml bait containers (see Bjordal et al. 1991, for description of pots and bait containers) or fitted with extract release devices (fig. 1) mounted on the top of the pot. The extract was released at the center of the pot through a tube from the outlet of the extract release device. The cylindrical release device had a "feeder compartment" (FC) and an "extract compartment" (EC), each with a rubber bellows. In the starting position, the FC-bellows was inflated with glycerine, the EC-bellows deflated and the EC filled with bait extract. The extract was released as a spring load deflated the FC-bellows, the escaping glycerine inflating the EC-bellows which then displaced the bait extract that was released through the tube. The flow rate of glycerine was controlled by the diameter of a nozzle between the bellows. Except one prototype with a 0.5 mm (diam.) nozzle, the other ten devices were fitted with 0.3 mm nozzles.

The investigation was carried out from 10 to 20 March 1992, in the Fanafjord south of Bergen, Norway - at 90 to 150 m depth, using a fleet of 40 pots with a pot spacing of 30 m

The "extract pots" were set randomly in between the pots baited with mackerel. The fleet of pots was fished eight times, with soak times from 13 to 22 h (over night), except one fleet that was soaked for 72 h.

The catch of each pot was recorded at retrieval and the Norway lobsters were sexed and measured (total length), and the extract consumption of the different release devices was measured. In the comparison between the two baits, the catch of each "extract pot" was compared with that of the preceding "mackerel pot".

RESULTS

A total of 471 and 126 Norway lobsters were caught in the mackerel and extract baited pots respectively, wich gave a mean catch rate of 2.0 Norway lobsters per pot on mackerel and 1.5 for extract (Table 1). However, the extract release devices had a large variation in release rate, with mean release rates ranging from 1.1 to 11.5 ml per hour (Table 2). It should be noted that exept for the prototype (release device no 11), the pots with mean extract release rates > 6 ml/h caught more Norway lobsters than the neighbouring (preceding) mackerel baited pots, while the pots with lower release rates had poorer catches than the mackerel pots (Table 2). A separate analysis of the catch data for the release devices with mean release rates > 6 ml/h (device no. 1, 2, 3, 4 and 8, excluding the data from fleet 1 and 2, where extract release rates were not measured) provided 28 paired comparisons, with a total catch of 57 Norway lobsters in the extract baited pots versus 37 for mackerel bait, giving a catch rate difference of 54% ($p = 0.04$, Wilcoxon signed rank test).

In the 1991 trials there was a marked difference in size of Norway lobster caught by extraxt or mackerel bait, with smaller individuals caught on extract baited pots (Fig. 2a), while no difference was found in the present investigation (Fig. 2b).

DISCUSSION

There was a significant improvement in catch rates and size selectivity of Norway lobster with controlled release of fluid bait extract compared with previous trials based on passive extract diffusion (Bjordal et al. 1991). In contrast to passive diffusion which presumably released less smell stimuli than natural mackerel bait, it is reason to believe that the bait release devices that functioned properly (released >6 ml / h) provided higher rates of bait odour, and hence attracted more and larger individuals from a wider area than did the mackerel bait.

The pot with the prototype (no 11) bait release device had a lower mean catch rate than the neighbouring mackerel pot, even if the mean extract release rate was relatively high (11.5 ml/h). The most likely explanation for this is the larger nozzle diameter of the prototype (0.5 mm versus 0.3 mm), which might have caused to rapid extract release so that the extract supply did not last for the whole fishing period.

The results from this study supports the hypothesis that increased release rates of smell stimuli may improve catch rates and size selectivity in pot fishing. However, the release control technology has still to be optimized with respect both to reliability and easy application in the fishery.

REFERENCES

Bjordal, Å., Løkkeborg, S. & Skeide, R. 1991. Effect of attractant distribution on catch rate and size selection of Norway lobster caught by pots. ICES C.M. 1991/B:45, 9p. [Mimeo].

Table 1. Number of pots, number of Norway lobster, and catch rates, for mackerel and extract baited pots.

Fleet no.	Soak time (hrs)	Mackerel baited pots			Extract baited pots		
		No. of pots	No. of Norway lobster	Catch rate	No. of pots	No. of Norway lobster	Catch rate
1	14	31	54	1.7	8	10	1.3
2	13	30	84	2.8	11	19	1.7
3	17	29	67	2.3	11	20	1.8
4	72	29	56	1.9	11	16	1.5
5	13	29	50	1.7	11	13	1.2
6	22	29	54	1.9	11	15	1.4
7	20	29	58	2.0	11	16	1.5
8	21	29	48	1.7	11	17	1.5
Total		235	471	2.0	85	126	1.5

Table 2. Release rates of extract (ml/h) for the different release devices, and total catch difference (number of Norway lobsters) between the pots with release device and the preceding mackerel baited pot (E-M, total).

Release device	1	2	3	4	5	6	7	8	9	10	11
Min (ml/h)	7.7	3.4	6.0	6.0	0.0	1.9	1.8	5.7	2.3	0.0	9.1
Max (ml/h)	10.8	8.8	13.1	10.4	2.9	10.5	5.9	10.0	6.2	3.1	16.2
Mean (ml/h)	8.9	6.5	9.0	7.7	1.1	5.5	4.5	7.9	3.9	1.5	11.5
E-M, total	4	3	4	1	-1	-9	-2	6	-11	-6	-2

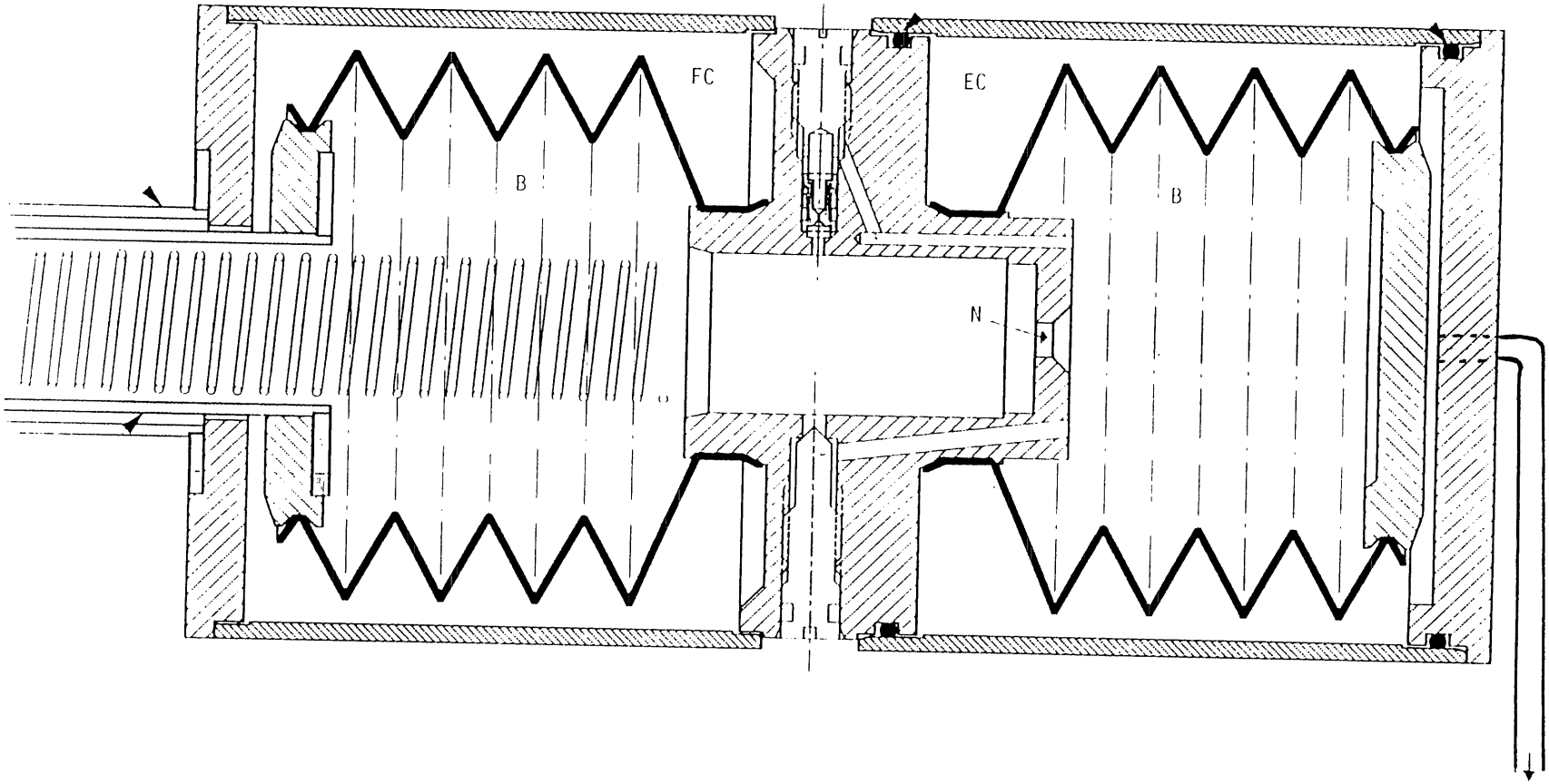

Figure 1. Extract release device. FC = Feeding compartment; EC = Extract compartment; B = Bellows.

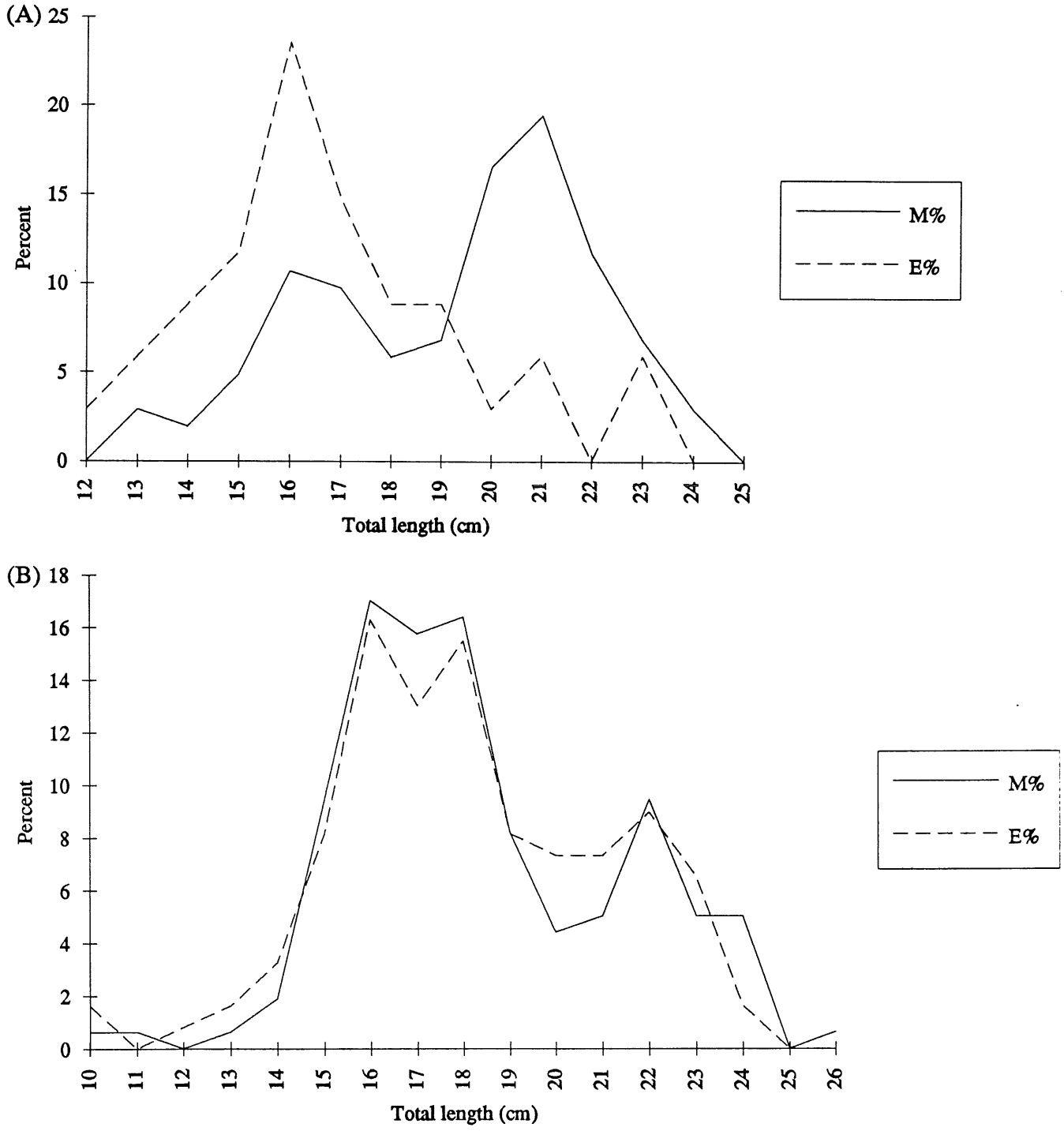

Figure 2. Length distribution of Norway lobster caught in pots baited with traditional mackerel (M%) and mackerel extract (E%); (A) with passive diffusion of extract (from Bjordal et al. 1991), and (B) with controlled extract release.