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FULL SCALE FISHING TRIALS FOR TUSK (BROSME BROSME) AND COD  
(GADUS MORHUA) WITH A COLLAPSIBLE FISH TRAP

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ABSTRACT

A collapsible fish trap with low weight and low stacking volume has been developed and tested in full scale fishing operations. The catch rates of tusk were promising, while the catches of cod were too low and variable to commercial fishing operation.

## INTRODUCTION

The new fish trap design used in this trial was developed in 1983, according to the following objectives: The trap should be easy to manufacture and easy to handle during the fishing operation. The latter objective required a design of low weight and with a low stacking volume. Further, Valdemarsen et.al. (1977), had found that the maximum catching efficiency for fish traps was obtained when the trap entrance was oriented down current. Another main objective of the new trap development was therefore to make a design that assured a down current orientation of the trap entrance.

The final prototype design is shown in Figure 1. The trap has a top and a bottom frame with no vertical connections, so that it collapses in air, but obtains its full volume in water by buoyancy and gravity forces. Further, the design was made slightly buoyant and anchored to the bottom mainline with a weight and a bridle to obtain a down current orientation of the entrance. Total weight of the trap is 5 kgs.

Experimental fishing with this prototype trap design gave promising results for tusk (Brosme brosme).

In 1986 the idea was adopted by a gear manufacturing company, and a series of 500 traps was made in order to conduct full scale fishing trials. The overall objective of these trials was to clarify the possibilities of profitable catches with this type of gear.

## MATERIALS AND METHODS

The trap was slightly different from the original prototype, being somewhat bigger, and non-buoyant, (Fig. 2). In addition the trial included traps with three different entrance designs: Horizontal - or vertical inner entrance opening, and one type with double entrance.

The trials were conducted on board a 109 feet longliner, with eight crewmembers. The deck layout is shown in Figure 3. The traps were fished as a longline operation, attached to the mainline by a 1.85 m branchline and a bridle attached to the bottom frame opposite the trap entrance. The traps were baited with 0.5 kgs of either squid, mackerel or offals from mackerel filleting, placed in bait bags of fine meshed webbing, mounted at the top panel of the trap.

#### Trial 1

This trial was conducted on tusk and ling grounds, with introductory trials at different localities off the west coast of Norway, from August 24 to August 27, and full scale trials at Aktivneset (N 62°40', E 03°35'), from August 27 to August 30, 1987. The fishing depth varied from 300 to 570 m.

The traps were originally set in fleets of one hundred, with a trap spacing of 37 m. Trials were also made with 74 m trap spacing.

The traps were baited with 0.5 kgs of either squid, herring or affalls/leftovers from mackerel filleting. The bait was put in special bait bags of webbing, mounted at the top panel of the trap.

#### Trial 2

This trial was conducted on cod grounds at Tromsøflaket (approximate position: N 71°23', E 16°45') from February 3 to 11, 1988. The fishing depth was between 280 and 450 m.

In this trial, the trap spacing was 56 m, and in addition to the bait types mentioned above, raw shrimp was tried as bait.

## RESULTS

### Trial 1

A total of 967 traps (new design, Fig. 2) were hauled with a total catch of 2696 fish, mainly tusk. The individual catches ranged from 0 to 17 - with an average catch of 2.8 fish per trap. The average fish weight was 1,67 kgs (without head and guts), which gives an average catch of 4,7 kgs per trap.

With the experimental setup it was possible to haul 4-5 fleets a day, dependent on the fishing depth.

There were no differences in catch rates between traps with different entrance design. The average catch rates for traps with double, horizontal or vertical entrance were 3,0, 2,74 and 2,86 fish per trap.

Trap spacing of 37 m gave an average catch of 2,5 fish per trap versus 3,35 fish per trap for 74 m trap spacing (34 % difference).

Catch rates versus soak time are given in Figure 4. As shown in the figure, there was no clear correlation between catch rate and soak time within the soak time range in this trial (6-24 hrs.).

A few traps of the original design (Fig. 1) was used in the experiment. A total of 19 traps were hauled, giving a total catch of 78 fish (4,1 fish per trap), which are 46 % higher catch rate than the new design.

## Trial 2

A total of 1799 traps were hauled, with a total catch of 4285 fish, mainly cod (79%), but also tusk (19%) and some mixed species (1%). The catch results with catch rates for traps with different entrances are given in Table 1.

Table 1. Catch and catch rates for traps with different entrances.

Entrance	NO. OF TRAPS		NO. OF FISH			CATCH RATES (FISH/TRAP)			
	Total	Without catch	Cod	Tusk	Other	Cod	Tusk	Other	Total
Double	573	151	951	177	13	1.66	0.31	0.02	1.99
Horizontal	608	93	1235	304	9	2.03	0.50	0.01	2.55
Vertical	618	76	1211	370	15	1.96	0.60	0.02	2.58
Total	1799	320	3397	851	37	1.89	0.47	0.02	2.38

The catchrate of the trap with double entrance was slightly lower than for the other entrance types, and there was a higher proportion of this trap with no catch. Length distributions for cod and tusk are shown in Figure 5.

## DISCUSSION

Trial 1 showed that the collapsible fish trap design might be an alternative fishing gear for tusk. Daily catches of 2-3 tons seem to be obtainable with a smaller crewnumber and a significantly lower bait consumption compared with a longline fishery for the same species.

The average catch rate was higher when the trap spacing was increased from 37 to 74 m. However, this increased catch rate did not compensate for the reduced effort (number of traps hauled per day). An intermediate trap spacing is therefore suggested as optimal in this fishery.

Also in the cod trials, there was no significant difference in catch rate between traps with different entrances. However, both a slightly lower average catch rate and a higher proportion of empty traps indicate that the double

entrance is inferior compared with the other types.

Catch rates of 2 cod per trap are too low for a commercial operation. This is enforced by the situation of the Barents Sea cod stock (unnormally high proportion of small fish with a low condition factor). Recent underwater TV-observations have, however, revealed that cod could escape from these traps (unpublished data). This suggests further development on entrance design to improve catch rates of cod.

#### REFERENCES

- Valdemarsen, J.W., Fernø, A. and Johannessen, A. 1977. Studies on the behaviour of some gadoid species in relation to traps. Coun. Meet. it. Coun. Explor. Sea, 1977 (B:42): 1-9. (Mimeo.)

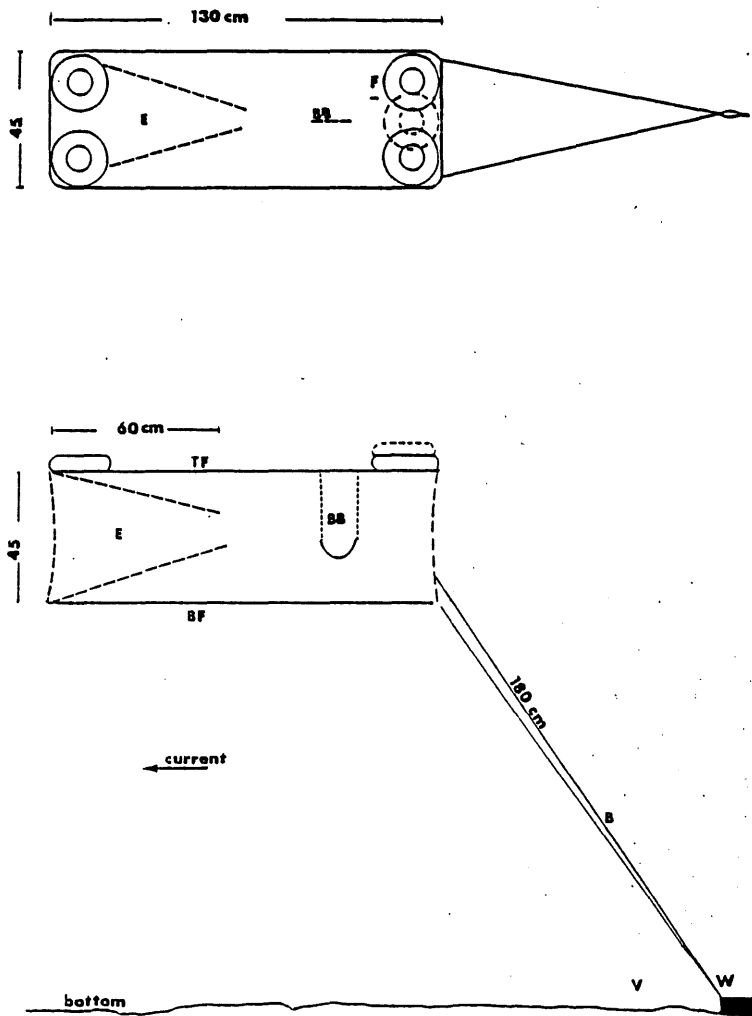


Figure 1. Collapsible fish trap, original prototype.

TF = top frame, BF = bottom frame, BB = bait bag,  
 E = entrance, F = float, B = bridle, W = weight (1.5 kgs)  
 Webbing = 55 mm (stretched mesh).

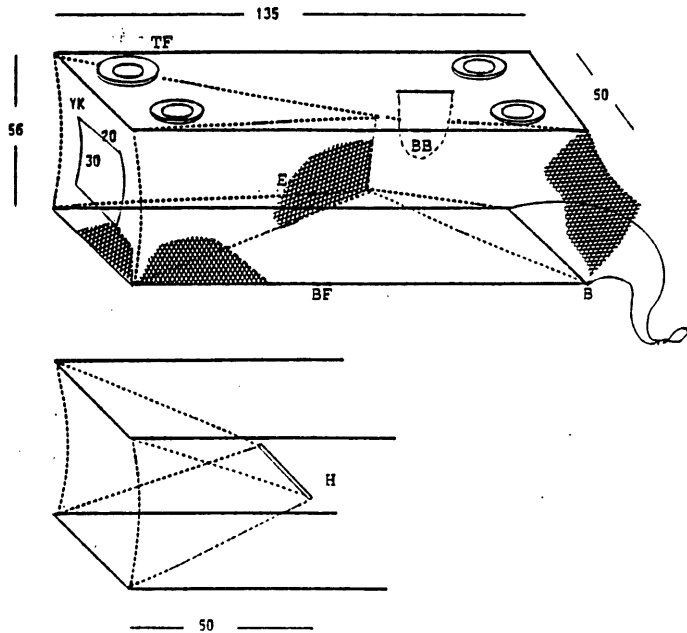


Figure 2. Collapsible fish trap, - new design (dimensions in cm).  
 TF = top frame (12 mm diameter, aluminium rod)  
 BF = bottom frame (12 mm, diameter, steel rod)  
 BB = bait bag, E = entrance, YK = outer entrance,  
 F = float, V = entrance with horizontal inner opening.

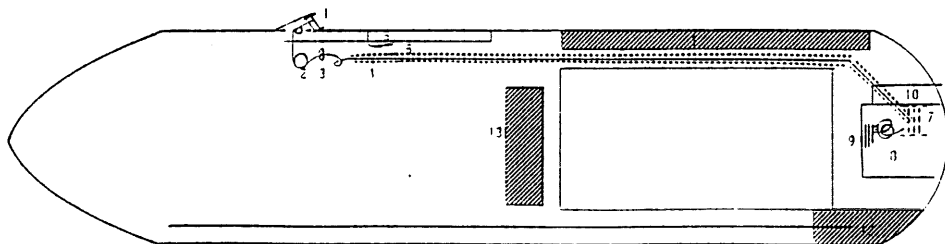


Figure 3. Deck arrangement at M/S "Smimes" during the trap experiments, August 1987.  
 1 = rail roller, 2 = capstan, 3 = slack hauler, 4 = pipe (PVC) rope leader, 5 = fish bin, 6 = position for baiting, 7 = slack hauler, 8 = rope bin, 9 = bridle rack, 10 = platform for shooting  
 shaded areas = trap storage



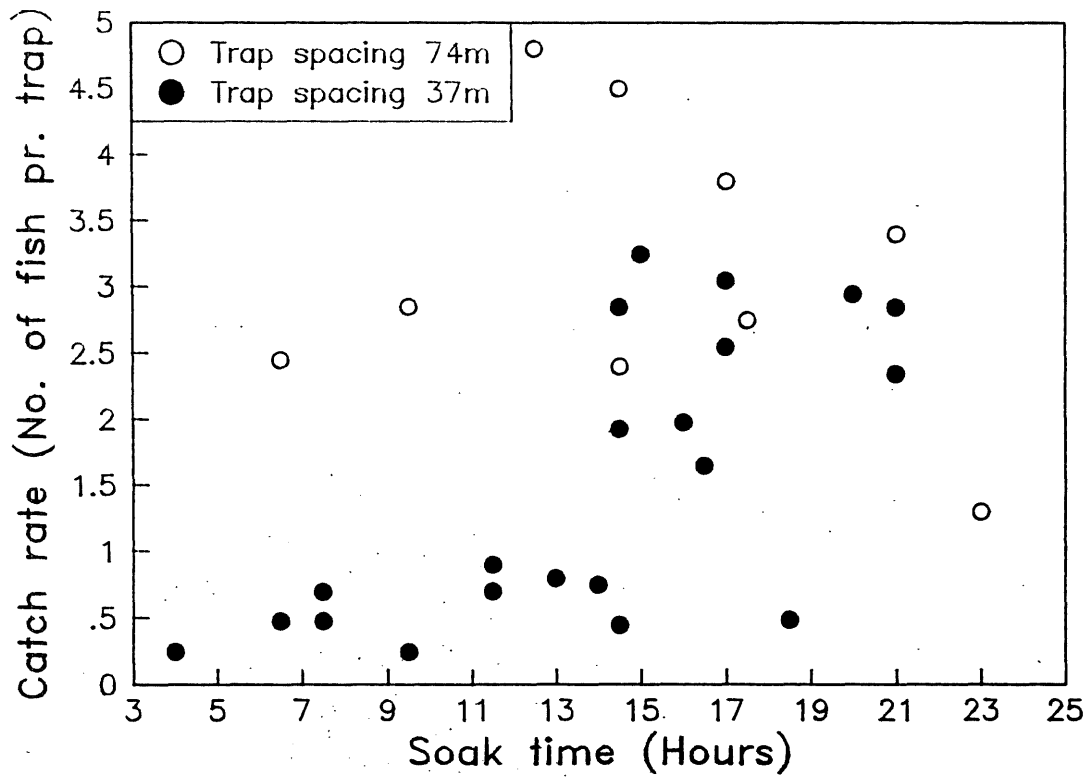


Figure 4. Catch rates versus soak time for 2 different trap spacings.

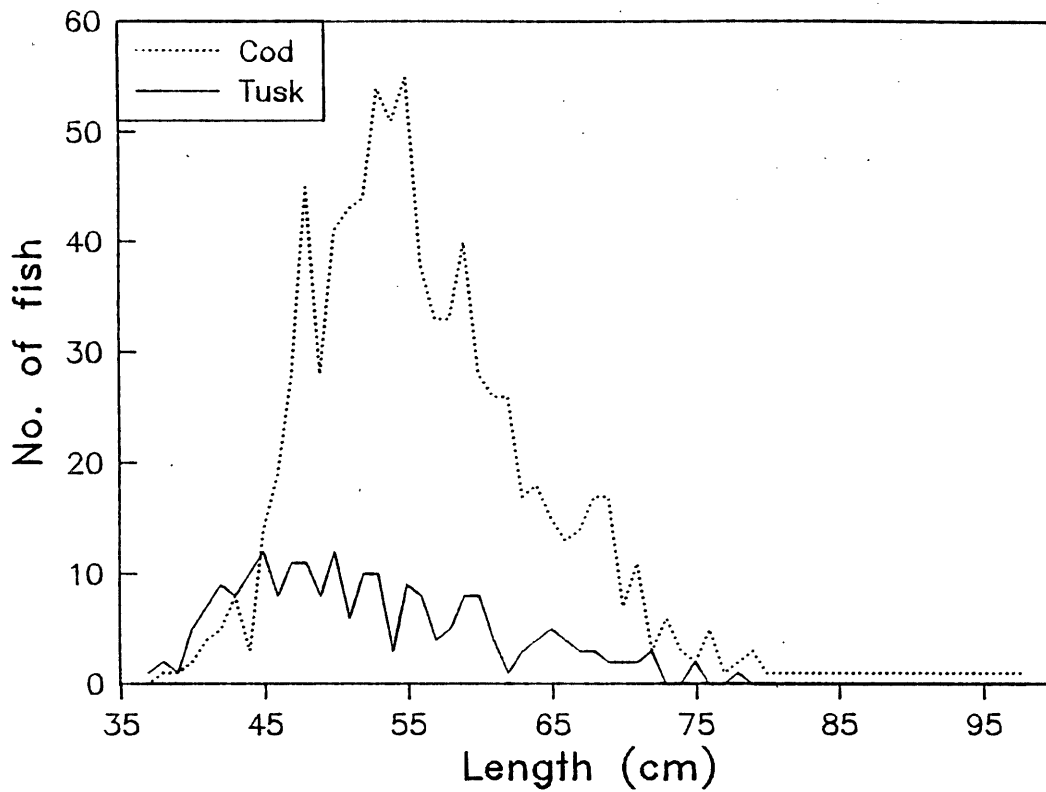


Figure 5. Length distribution of cod and tusk.

