ON THE RELATIVE CATCH EFFICIENCY OF DIFFERENT SHAPED OTTER BOARDS IN BOTTOM TRAWLING

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Three different types of otter boards varying in shape were tried to find out their relative catch efficiency. They were operated with two types of nets. The results indicated that the curved otter boards gave more catch per unit effort with all the combinations of nets and riggings tried.

INTRODUCTION

That any modification or alteration to the fishing equipment has to be aimed to obtain maximum catches needs no particular emphasis. This is all the more so in otter trawling wherein a great deal of changes have been effected to the size and shape of the otter boards for the increased efficiency of the gear. Poliakov (1962), based on his experiments conducted on the East Coast, recommends the use of an oval single slitted doors. This type of boards are in frequent use in the Kakinada area, as against the conventional flat rectangular boards used at other centres. In order to evaluate the relative efficiency of the different otter boards under identical fishing conditions and in terms of catch, comparative experiments were undertaken with three different shaped otter boards at Kakinada Centre and the findings of these experiments are incorporated in this paper.

MATERIALS AND METHODS

Three types of otter boards in flat rectangular, horizontal curved and oval (Hydrofoil in cross section with single slit) shapes, were used for the study. The specifications and design details of each of the boards are similar to those used by Mukundan *et al.* (1967). Since two types of two seam trawls and two rigging are popular in this region, these otter boards were experimented with each combination to evaluate their comparative efficiency under all combinations. The nets used were 12.9 m. (42.5′) two seam trawl (Satyanarayana and Nair, 1962) and 11.89 m (39′) two seam trawl, the design details of which are given in Fig. I.

The two types of riggings include the use of double legs of 7.3 m (24′) between the otter board and the net and 15 m single sweep wire in addition to 7.3 m (24′) legs, which is a similar method as adopted by Poliakov (1962).

A small trawler 'Fish Tech. No. 1' (9.13 m (30′) O. A. L. with 36 H. P. Engine) was used for experimental fishing. Operations were conducted off Kakinada during the fishing season of 1964–65, at depths ranging between 10 to 25 m (mostly at 10 to 18m), and where the bottom is muddy. Both the nets were towed at an approximate speed of 2 knots.

With each of the four combination i. e. 'A' 12.90 m (42.5′) net with 7.3 m (24′) double legs, 'B' 12.90 m (42.5') net with double legs of 7.3 m (24′) and single sweep of 15 m wire, 'C' 11.89 m (39′) net with 7.3 m (24′) double legs and 'D' 11.89 m (39′) net with 7.3 m (24′) legs and 15 m. single sweep wire, the three otter boards were successively operated in rotation, thus keeping the net and rigging constant, the varying factor being the otter boards. For each haul, the horizontal spread between otter boards, the warp tension on board, and the catch details were recorded. The methods suggested by Deshpande (1960) and Satyanarayana and Nair (1965) for calculation of spread and estimation of warp tension respectively were adopted.

The shooting and hauling operations of the gear were done by the conventional method from the stern of the boat using winch and rollers. Sweep wires were hauled up by the winch side drums after completely hauling the warps and locking the otter doors to the stern posts.

Results

The details of the average catch rate in each combination of the net and rigging as well as the combined results with the three types of otter boards are given in Table I.

The corresponding average horizontal spread (in terms of distance between otter boards) and warp tension are given in Table III while the percentage frequency of the highest catch per unit effort in each combination with three boards are tabulated in Table II.

Discussion

Relative Catch Efficiency

Table I clearly indicates that the total catch per one trawling hour is more with curved otter boards for all combinations of gear except in 'D', where the catch rate with oval otter board is slightly more by only 0.8% which can be taken as non-significant. This increased catch with curved doors may be due to increased area swept during trawling. The combined results of all the operations, irrespective of gear and rigging also show an increase in catch with curved otter boards by about 39.5% and 36.0% respectively over the flat and oval otter boards. The efficiency of the latter two boards in terms of catch per unit effort was more or less equal.

Better prawn catch, both in terms of quality and quantity, was seen for all combinations of gear operated with curved otter boards than with other boards. This fact is due to increase in horizontal spread and coincides with the observations of Kuriyan *et al.* (1962), that for increasing the prawn catch, horizontal spread of the net should be more, so as to cover more area laterally instead of vertically. In terms of fish catch also, the same trend i. e., increase in catch, was noticed under all experimental combinations with curved otter boards except in 'D' where oval otter boards gave comparatively better catch.

It is evident from Table II that the percentage of frequency of the highest catch per unit effort is always more in the case of observations made with curved otter board proving its efficiency over the others. The highest percentage of catch rate at 50% confirms the efficiency of the curved otter board over that of oval otter

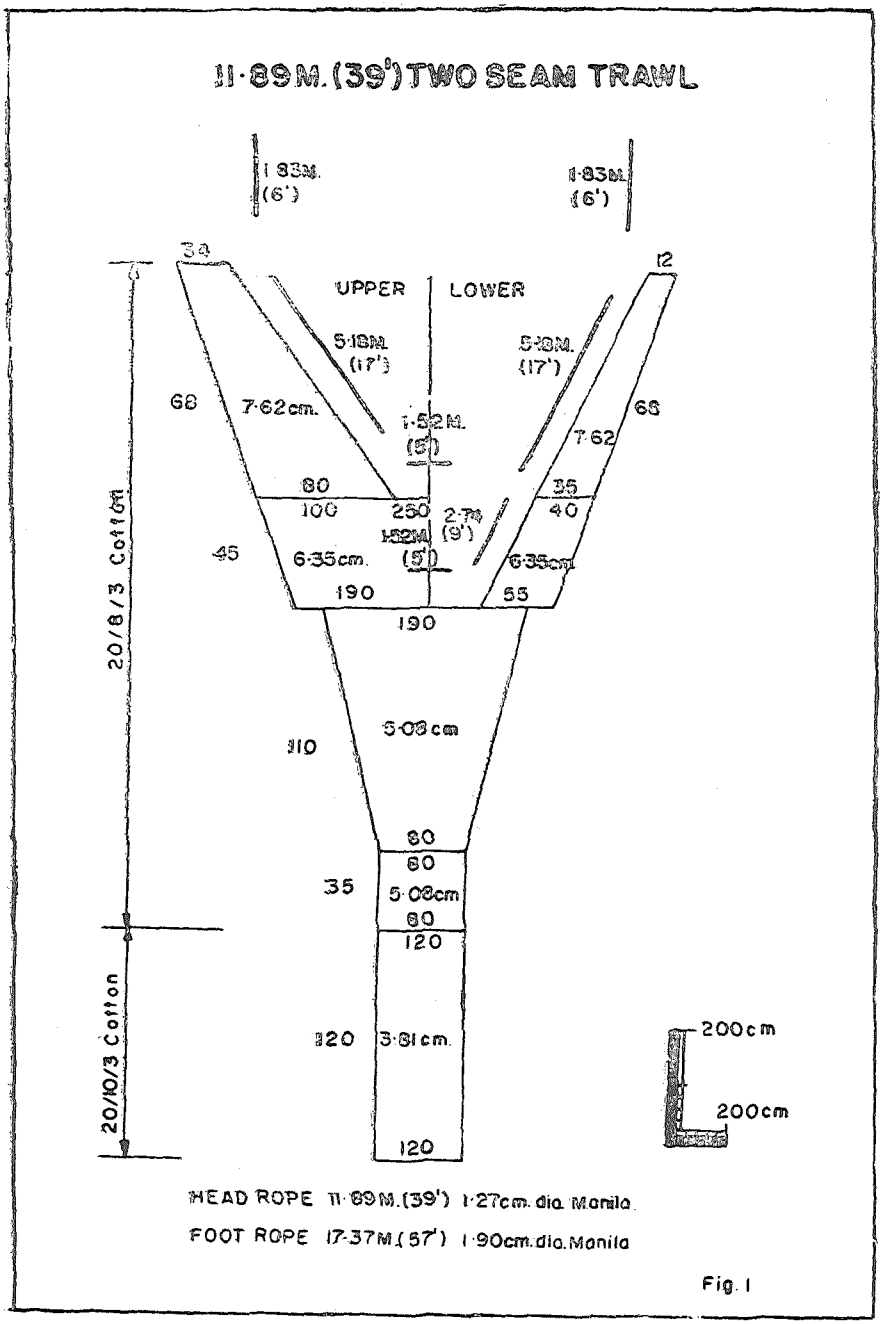
11·89M.(39') TWO SEAM TRAWL
1·83M. (6')
1·83M. (6')
34
12
UPPER
LOWER
5·18M. (17')
5·18M. (17')
68
7·62cm.
1·52M. (5')
7·62
66
80
100
250
2·7M (9')
35
40
45
6·35cm.
1·52M (5')
6·35cm
190
55
190
110
5·08 cm
80
80
35
5·08cm
80
120
120
3·81cm.
120
200cm
200cm
20/8/3 Cotton
20/10/3 Cotton
HEAD ROPE 11·89M.(39') 1·27cm. dia. Manila
FOOT ROPE 17·37M.(57') 1·90cm.dia.Manila
Fig. 1

TABLE I CATCH PARTICULARS WITH THREE TYPES OF OTTER BOARDS
(Catch in kgs. per trawling hour)

	Types of Combination.	Flat.			Curved.			Oval.		
		Prawn	Fish	Total	Prawn	Fish	Total	Prawn	Fish	Total
'A'	12.90 m (42.5′) net with 7.3 m (24′) double legs.	15.72	21.83	37.55	21.52	33.37	54.89	8.30	21.00	29.30
'B'	12.90 m (42.5′) net with 7.34 m (24′) double legs and 15 m Single Sweep wire.	16.7	22.60	39.3	19.74	31.42	51.16	14.52	23.10	37.62
'C'	11.89 m (39′) net with 7.3 m (24′) double legs.	12.72	20.90	33.62	26.00	26.00	52.00	14.80	18.75	33.55
'D'	11.89 m (39′) net with 7.3 m (24′) double legs and 15 m Single Sweep wire.	8.60	22.50	31.1	10.00	31.70	41.80	8.80	33.30	42.10
	Combination of all above irrespective of gear and rigging.	13.26	22.08	35.34	18.50	30.82	49.32	11.56	24.70	36.26

TABLE II. FREQUENCY OF THE HIGHEST CATCH PER UNIT EFFORT WITH THREE TYPES OF OTTER BOARDS (IN PERCENTAGE)

	Type of Combination.	Flat	Curved	Oval
'A'	12.9 m (42.5′) net with 7.3 m (24′) double legs.	12.2	87.5	—
'B'	12.9 m (42.5′) net with 7.3 m (24′) double legs and 75 m Single Sweep wire.	10	80	10
'C'	11.89 m (39′) net with 7.3 m (24′) double legs.	—	88	12
'D'	11.89 m (39′) net with 7.3 m (24′) double legs and 15 m Single Sweep wire.	16.7	50	33.3

TABLE III. DISTANCE BETWEEN OTTER BOARDS AND WARP TENSION WITH THE THREE TYPES OF OTTER BOARDS.

Type of Combination.		Distance between Otter Boards in meters (feet)			Warp tension in Kgs.		
		Flat	Curved	Oval	Flat	Curved	Oval
'A' 12.90 m (42.5') net with 7.3 m (24') double legs.	Average	10.21m (33.5')	11.89m (39.3')	10.3m (33.8')	296	306.5	288.5
	Range	12.0-9.36m	14 - 10.45	11.43-8.74	270-312	270-312	260-312
'B' 12.90 m (42.5') net with 7.3 m (24') double legs and 15 m Single Sweep wire.	Average	14.78m (48.5')	17.98m (59')	14.57m (32')	304	308	303.5
	Range	17.4-12.9m	20.5-15.9m	17.86-12.9m	270-328	270-320	280-312
'C' 11.89m (39') net with 7.3 m (24') double legs.	Average	10m (30')	11.34m (37.2')	9.75m (32')	307	308.5	298.5
	Range	12.22-8.23m	12.86-10.36m	11.1-9.14m	280-328	300-328	280-312
'D' 11.89 m (39') net with 7.3 m (24') double legs and 15 m Single Sweep wire.	Average	13.44m (44.1')	16.61m (54.5')	13.78m (42.5')	309	304	304
	Range	15.68-11.37m	18.87-14.72m	16.25-12.2m	280-320	280-312	270-312
Combination of all above irrespective of gear and rigging.	Average	12.12m (39.77')	14.17 (47.5')	12.1m (39.7')	304	306	299
	Range	17.4-8.23m	20.5-10.36m	17.86-8.74m	270-328	270-328	270-328

board in 'D' combination where the average catch rate with the latter is more.

Horizontal Opening

From table III it would be seen that the lateral spread between the otter boards in all combinations of experiments was always more with curved otter boards than the other two and is 15% and 21.7% more with double leg and single sweep systems respectively. This increase may be due to the increased shearing force or force of efficiency which arises according to Crewe (1964) from its forward surface being at smaller angle to the direction of motion than in the case of flat otter boards, thus allowing the water to flow round it more smoothly.

The horizontal spread, obtained in the case of the other two types of otter boards is found to be practically same in all combinations and is not in confirmation with the observations of Treschev (1964) that the oval shaped slotted otter boards have 15% greater spreading force than comparable rectangular otter boards. This difference may arise from the fact that there is some difference in areas and surface ratio between them.

Warp resistance

Taking into consideration that the fishing gear, rigging and conditions same, the difference in warp resistance is attributed to the different otter boards used. As can be seen from the Table III, the oval otter boards gave less tension in all combinations, where as curved otter boards gave more resistance followed by flat otter board (Mukundan *et al.*, 1967).

SUMMARY

Three different types of otter boards varying in shape were tried to find out their relative catch efficiency. They were operated with two types of nets. The results indicated that the curved otter boards gave more catch per unit effort with all the combinations of net and rigging tried. The efficiency or the flat rectangular and oval otter doors was more or less equal. With curved otter boards the net gained more horizontal spread when compared with the other two types of otter boards with which the lateral spread of the net was more or less equal. Oval otter boards gave less warp resistance, while the curved otter boards gave more tension followed by flat rectangular otter boards.

ACKNOWLEDGMENT

The author thanks Dr. A. N. Bose, Dircctor, Mr. G. K. Kuriyan, Senior Research Officer, and Mr. A.V.V. Satyanarayana, Research Officer, Central Institute of Fisheries Technology, for their valuable suggestions for preparing this paper. His thanks are also due to Mr. K. A. Sadanandan, Research Officer, Central Institute of Fisheries Technology, for his guidance during the execution of the work.

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