

TWIN TRAWLING FOR SHRIMP WITH DUMMY DOORS

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Twin trawling, a new concept in shrimp trawling is described in this paper. It essentially involves towing of two trawls of equal size connected in sequence at the inner head and foot rope legs and using a pair of outer otter boards and central neutral door or dummy door with triple bridles and single tow warp. A comparative study with conventional stern trawling using a standard 13.7 m. four seam shrimp trawl and two 6.8 m. standard four seam trawls as twin-rig has shown considerable reduction in the utilization of power (20 %) with better efficiency in shrimp fishing.

INTRODUCTION

Double-rig shrimp trawling was developed in the Gulf of Mexico during 1959 (Bullis Jr., and Floyd, 1972) and became principal gear in off shore shrimp fishery (Robas, 1959; Harrington, Marton and James, 1972). Subsequently this method became popular in Belgium for shrimp (Verhoest and Maton, 1964) and in Netherlands for shrimp as well as flat fish (De Witt, 1964). There were scattered attempts in the application of twin trawling in the North sea for sole fishery (Anon, 1970; 1971) and in the Gulf of Mexico for shrimp (Bullis Jr. and Flyod, *op. cit.*). In India Panicker *et al.*, (1977) developed

double-rig shrimp trawling and further took up studies on twin trawling for shrimp. Eventhough twin trawling for shrimp elsewhere are double-rig twin trawling using outrigger booms, these studies are conducted from stern deck with only one set of gear.

MATERIALS AND METHODS

The departmental research vessel 'Fish-tech 8' a 15.2 m. L.O.A. wooden vessel provided with 82/102 H.P. engine, was suitably rigged for the studies. This method essentially involves towing of two trawls using a single pair of otter boards. The two trawls are joined at the inner head and foot rope legs to a 'neutral

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A hand-drawn diagram illustrating a 'TWIN-RIG' fishing gear system. At the top left, a small boat is shown on the water. A line labeled 'TOWING WARP' extends from the boat to a central point. From this point, two lines branch out to two separate fishing rigs. Each rig consists of an 'OTTER BOARD' (a rectangular weight) and a 'SHOULDER' (a curved, cross-hatched net). A 'GLED' (a small hook or lure) is attached to the line between the otter board and the shoulder. The entire diagram is enclosed in a rectangular border.

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TABLE I
PARTICULARS OF THE TRAWL GEAR

Method of operation	Net used	Head rope	Foot rope	Legs	Sweeps	Floats	Sinkers	Otter boards
Single-rig	one 13.7 m. four seam trawl	13.7 m. 12.5 mm. manila	15.2 m. 19.0mm. manila	2 m. 12.5 & 19.0mm. manila	5 m. manila	9 no. 12.7 cm. dia.	50 no.	1.4 × 0.63 m. rectangular flat 55 kg.
Twin-rig	Two 6.8 m. four seam trawls	6.8 m. 12.5 mm. manila	7.61 m. 19.0mm. manila	1 m. 12.5 m. & 19.0mm. manila	2.5 and 3.25 m. manila	5 no. 12.7 cm. dia. for each net	25 no. for each net	0.90 × 0.45 m. rectangular flat + 1.00 × 0.50 m. (dummy door)

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door' which is connected to a third bridle. This neutral door is called 'central bridle ski' in Europe and 'sled' or 'dummy door' in Gulf of Mexico. The design details of sled (double framed dummy door) is given in fig. 1.

The nets selected for the twin-rig are two 6.8 m. four seam shrimp trawls (Panicker *et al.*, *op. cit.*) with 0.90×0.45 m. rectangular flat otter boards (Satyanarayana and Nair, 1962). For comparative purpose one 13.7 m. four seam trawl with 1.34×0.63 m. rectangular flat otter boards (Satyanarayana and Nair, *op. cit.*) was used as conventional single-rig.

The conventional single-rig gear was operated using double stern gallows, and twin-rig using single tow warp and triple bridles leading through a central stern roller (fig. 2).

The three bridles used were 6 mm. dia. wire rope of 50 m. length each shackling one each to the outer otter boards and central neutral door at one end and the other ends shackled together and swivelled to the free end of the tow warp. Two standard 6.8 m. four seam cotton shrimp trawls joined at the inner head and foot rope legs were attached to the otter boards and central neutral door by way of sweep lines. The outer sweep lines are kept 0.75 m. longer than the inner sweep line to compensate the distance lost along the towing axis by equal length of all bridles. In short, twin trawling method involves towings of two shrimp trawls on a single cable and triple bridles using a pair of otter boards (outer) and a central neutral door (inner). The two trawls are joined at the inner head and foot rope legs and connected to the

otter boards and neutral door by sweep lines. The details of the gear and accessories are given in Table I.

Fishing trials were conducted using both single and twin rigs on each day by rotation keeping the fishing parameters constant. The data on tension and catch details of 25 paired hauls collected and analysed are given in Tables II and III.

RESULTS AND DISCUSSION

The data on catch clearly indicate the effectiveness of twin trawling over the conventional trawl in shrimp catch. The composition of shrimp in the catch is nearly 2.5 times more than that in the latter. However, conventional trawl has shown its better performance for fishes which can be attributed to its better vertical opening (Panicker *et al.*, *op. cit.*).

The average tensions offered by the gear are 300 and 373 kg. respectively for twin-rig and conventional trawls. This indicates that twin-rig trawl can be towed with significantly less power than the maximum horse power (80%) used by the single-rig. This unutilised power can be profitably made use of by increasing the overall head rope length of twin-rig gear. This has substantiated earlier observations (Panicker, *et al.*, *op. cit.*) in double-rig shrimp trawling. However, further studies are required for arriving at definite conclusions.

Some other apparent advantages of twin-rig gear are light weight, and ease of handling. It is claimed that vessel can negotiate sharp turns with fewer incidence of entangling as a result of crossing of towing warps.

TABLE II

TENSION AND CATCH DETAILS OF SINGLE-RIG AND TWIN-RIG TRAWLS

Fishing ground: off Veraval 20°45' to 21°N Lat. and 70°05' to 70°20' E. Long. 20 to 30 m.

Method of operation	No. of hauls	Duration hrs. mts.	Speed knots	Tension kg.	Catch in kg.			Catch composition in %	
					Shrimp	Fish	Total	Shrimp	Fish
Single-rig trawl 13.7 m. — one	25	18 - 45	2	373.0	21.45	512.10	533.55	3.9	96.1
Twin-rig trawl 6.8 m. — two	25	18 - 45	2	300.0	32.65	322.50	355.16	9.3	90.7

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TABLE III
ANALYSIS OF VARIANCE

Source	df	S. S	M. S.	F
Shrimp catch:				
Total	49	1.3125		
Between hauls	24	0.7225	0.0301	1.43
Between nets	1	0.0825	0.0825	3.91*
Error	24	0.5075	0.011	
Tension:				
Total	49	120684.50		
Between nets	1	66029.78	66029.78	60.87†
Between hauls	24	28620.0	1192.5	1.1
Error	24	26034.72	1084.78	

* 10% level of significance.

† 1% level of significance.

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