

On the Performance of Otter Trawls Operated from a 15.4 m Trawler off Veraval

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Results obtained with three trawl nets namely, 13.7 m four seam, 15.8 m six seam and 18.3 m four seam operated from a 15.4 m wooden trawler, are presented. Among the three nets operated, 15.8 m six seam trawl and 18.3 four seam trawl were found to be equally effective for the capture of shrimp and during the lean season 15.8 m six seam trawl can be successfully operated to exploit demersal as well as semi-pelagic fish resources. The catch data were analysed using analysis of variance and Gulland's method.

Trawling as a commercial method of fishing has made tremendous strides during the last two decades all along the Indian coast and the present trend is towards acquiring bigger trawlers to cope up with the need to exploit the vast fish resources of Indian territorial waters. Deshpande & Kartha (1964) have described the results of

study, the authors have attempted to assess the suitability of an otter trawl for operation from a 15.4m wooden stern trawler.

Field trials were conducted in the sea off Veraval and three to nine hauls were taken on each day of operation under identical conditions. The grounds fished were the

Table 1. *Particulars of gear and accessories*

Head rope m	13.7	15.8	18.3
Foot rope m	15.2	20.5	18.3
Type of trawl	Four seam	Six seam	Four seam
Material	Cotton	Nylon	Cotton
Mesh size cm			
Wing	5.08	6.38	7.62
Belly	5.08	5.08	6.38 to 5.08
Cod end	3.17	3.17	3.17
Length of sweeps m	5 & 10	5 & 10	5 & 10
No. of floats	11	15	13
Extra buoyancy kg	8.7	11.6	10.3
Weight of sinkers kg	11.5	15.7	13.9
Weight of sinkers/m length of foot rope	0.76	0.76	0.76
Tow line	12 mm diameter galvanised flexible steel wire rope		

different types of nets operated from a 10.9 m (36') stern trawler. In the present

study, the authors have attempted to assess the suitability of an otter trawl for operation from a 15.4m wooden stern trawler. Field trials were conducted in the sea off Veraval and three to nine hauls were taken on each day of operation under identical conditions. The grounds fished were the

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Materials and Methods

A wooden fishing vessel OAL 15.4 m fitted with 82/102 HP engine was employed

for the field trials. Three nets, namely, 13.7 four seam (Deshpande *et al.*, 1968) 18.3 m four seam (Joshi & Deshpande, 1964) and 15.8 m six seam (Deshpande *et al.*, 1970) otter trawls were selected for the comparative studies. The otter boards used were similar to the ones described by Satyanarayana & Nair (1962). Particulars of the gear used during the course of the present studies along with accessories are tabulated in Table 1.

Results and Discussion

Based on Table 2, the average catch per trawling hour for 13.7, 15.8 and 18.3 m

nets was worked out as 99, 234 and 217 kg respectively which indicates that 15.8 and 18.3 m nets can be successfully operated on commercial basis from a vessel of 15.4 m OAL.

To test the difference of the catching efficiency of the three nets, the quantity caught by each net was converted to logarithmic values, before analysing the variance separately for prawn, fish and total catches. As the difference among the mean catches of the nets is highly significant (Table 3), the nets differ in their performance as judged

Table 2. *Results of fishing operations*

Gear employed	13.7 Four seam trawl	15.8 Six seam trawl	18.3 Four seam trawl
Number of hauls	35	35	35
Duration of hauls	23 h 20 min	23 h 20 min	23 h 20 min
Total catch kg			
Prawn	12.10	31.73	70.90
Fish	2287.90	5424.27	4996.10
Total	2300.00	5456.00	5067.00

Table 3. *Analysis of variance of the logarithmic value of catch*

Source	Sum of squares	df	ms
i) Prawn catch:			
Between nets	1.2545	2	0.6273**
Between days	3.0025	34	0.0883**
Error	2.1345	68	0.0314
Total	6.3915	104	
ii) Fish catch:			
Between nets	3.0349	2	1.5175**
Between days	5.4673	34	0.0883**
Error	1.7357	68	0.0255
Total	10.2380	104	
iii) Total catch:			
Between nets	3.0892	2	1.5446**
Between days	5.3865	34	0.1584**
Error	1.6905	68	0.0249
Total	10.1662	104	

** Highly significant

from the catches. Day to day variation in the catches is also found to be highly significant. The least significant differences (LSD) were calculated to compare the performance of each net with the others. The means of the logarithm of catches and the LSD are given in Table 4.

As evident from Table 4 each net is found to differ from the others in the efficiency for catching prawns and for this purpose 18.3 m net appears to be the most efficient among the three nets considered. For the capture of fish and with regard to the total catch, no significant differences were observed between 15.8 m six seam and 18.3 m four seam trawls and in comparison these two nets were more efficient than 13.7 m net.

The results of the comparison of fish catches between 15.8 m six seam trawl and 13.7 m four seam trawl were also analysed using the method proposed by Gulland

(1967) and adopted subsequently by Dickson (1971). For this, the variance,

$$S_x^2 = \frac{1}{n-1} \left[\sum x^2 - \frac{(\sum x)^2}{n} \right]$$

was first computed and S_x was calculated as 0.207 for the fish catches.

Standard deviation after 35 hauls $\left(\frac{0.207}{\sqrt{35}} \right)$ came to 0.035 and 95% confident limit for the ratio after 35 pairs of hauls

$$= \text{antilog} \left(\text{Log } \sum \frac{L}{S} \pm \frac{2 S_x}{\sqrt{n}} \right)$$

$$= 2.36 \text{ (ranging from 2.01 to 2.76)}$$

where, L and S are the fish catches of 15.8 m and 13.7 m nets respectively and $x = \log L/S$

This refers to one series of experiments wherein the data on the fish catch ratio of 15.8 m six seam net and 13.7 m four seam net were taken into account and found

Table 4. *The means of the logarithm of catch and LSD*

Type of catch	Mean of the logarithm of catch			LSD
	13.7 m	15.8 m	18.3 m	
Prawn	0.1067	0.2363	0.3774	0.1018
Fish	1.7442	2.1270	2.0778	0.0918
Total	1.7463	2.1297	2.0868	0.0906

Table 5. *Percentage composition of the catch in three nets*

	% composition		
	13.7 m	15.8 m	18.3 m
Prawns	0.52	0.60	1.41
Sciaenids	22.42	27.53	23.07
Polynemids	6.50	2.96	4.66
Eels	1.28	2.43	1.60
Elasmobranchs	12.22	23.45	8.00
Pomfrets	0.23	0.50	0.12
Ribbon fish	0.42	0.52	0.27
Chirocentrus sp.	0.53	0.10	2.14
Pellona sp.	1.95	5.73	3.35
Cat fish	1.53	0.21	0.42
Perches	1.30	0.75	0.68
Miscellaneous	51.10	35.22	56.28

to be 2.36:1 (95% confidence limit 2.01 to 2.76) which proves the effectiveness of the 15.8 m six seam net in the exploitation of fish when compared to 13.7 m four seam net.

During the operation, qualitative as well as quantitative analysis of the catch landed during each haul with reference to each net was done and the data are presented. Prawns, *Polynemids*, eels and miscellaneous varieties of fish were caught more by 18.3 m net. *Sciaenids*, *Elasmobranchs*, pomfrets, ribbon fish, *Pellona* sp. and perches were landed more by 15.8 m six seam trawl. As most of these fishes are off bottom column swimming fishes, it is inferred that the vertical height obtained by this gear is comparatively higher.

The towing resistance of each net was recorded with the help of a tension meter (Satyanarayana & Nair, 1965) and the average was observed to be 482, 506 and 518 kg respectively for 13.7, 15.8 and 18.3 m trawls. It is concluded that 15.8 m six seam trawl and 18.3 m four seam trawl are best suited for operation from medium sized trawlers along this part of the north-west coast of India.

The authors are grateful to the late Shri G. K. Kuriyan, former Director for his encouragement and to Dr. C. C. Panduranga Rao, Director, Central Institute of Fisheries Technology, Cochin for his kind permission to publish this paper. They are indebted to Shri P. A. Panicker for critically reading the manuscript and offering suggestions. Thanks are also due to Shri A. K. Kesavan Nair and Smt. K. Radhalakshmi for the help in the statistical analysis.

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