BELLY DEPTH STUDIES FOR SHRIMP TRAWLS - PART II

H. N. MHALATHKAR* AND G. JAGADEESHAN**
Central Institute of Fisheries Technology, Craft & Gear Wing, Cochin-5.

The paper details further experiments conducted for a reduction in the depth of belly of a 13.69 m (45′) four seam shrimp trawl net. The investigations have given conclusive evidence that the optimum depth of belly for this particular trawl design should be 70 meshes.

INTRODUCTION

Investigations on possible reduction in depth of belly without adversely affecting the mechanical characteristics and catching efficiency of 13.39 m (45′) four seam cotton trawl net have already been reported (Mhalathkar and Iyer, 1966). Although these experiments gave satisfactory results, the possibilities of further reduction could not be ruled out. Hence during 1966-67 fishing season, further experiments on the same lines were conducted to find out optimum depth of belly for the particular design of trawl.

MATERIALS AND METHODS

A 13.69 m (45′) four seam cotton trawl net with 75 meshes in depth of the belly was selected as the control net (net 'D' of the previous investigations, Mhalathkar & Iyer, *loc. cit*). Two other experimental nets 'E' and 'F' were constructed reducing in all 30 meshes in the depth of the belly in two stages. The dimensions of the bellies of the control net ('D') as well as the other two experimental nets ('E' and 'F') are shown in Fig 1.

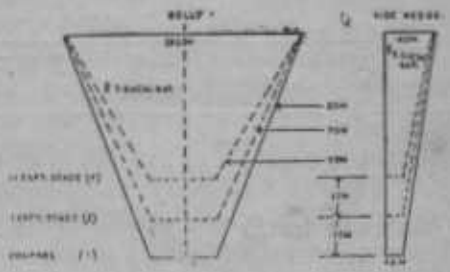

Fig 1. Bellies and side wedges showing different stages

On each day of operation, all the three nets were operated in rotation and as far as possible all the fishing conditions namely, fishing ground, depth of ground, length of warp released, towing speed, towing durations, direction of tow, number

* Present Address: C. I. F. T. Sub-station; Veraval (Gujarat State).
** Present Address: C. I. F. T. Unit; Goa.

of floats on head rope, weight of sinkers on foot rope and size of otter boards were kept constant.

Results and discussion

24 fishing trips were undertaken and 24 comparative hauls made with each of the three nets. Data for the towing duration, percentage horizontal opening, resistance, prawn catch, fish catch and total catch were collected and these are tabulated in the Table I.

The nets were randomised over the fishing days throughout the experiment. Data collected for horizontal opening, tension in warps, catch of prawns, catch of fish and total catch were analysed and the analysis of variance tables prepared for each. For prawn, fish and total catch the figures were converted into their corresponding logarithmic values prior to analysis.

The percentage opening of the three nets showed significance at 5% level as would be seen from Table II. The average horizontal opening of the nets 'D', 'E' and 'F' are 47.60, 48.20 and 47.07 respectively. The net 'E' showed a slightly higher horizontal openig as compared to nets 'D' and 'F' The tension offered by the three nets were not significant at 5% level. Considering the prawn catch of the three nets during the same period the analysis of variance (Table III) shows that they are significantly different ($P < .01$). The total logarithmic catch of prawns of the three nets were 19.5111, 23.6030 and 18.3534 respectively. The net 'E' showed superiority over the other two nets 'D' and 'F'. But the fish catch of the three nets did not reveal superiority for any net in their catching rate. However, the total catch of the three nets were significantly different ($P < .01$). The total logarithmic catch over 24 hauls were 30.4967, 34.9261 and 30.0254 respectively for 'D', 'E' and 'F'. Among the three nets, 'E' caught more and 'D' and 'F' were more or less equal in their catching rates. In all these cases the between-day variations were

TABLE I DETAILS OF OPERATION

Nets	No of hauls	% opening†	Tension in kg. *	Catch in kg. *		
				Prawn	Fish	Total
'D' (85 meshes in depth)	24	47.60	304.0	7.02	13.60	20.62
'E' (70 meshes in depth)	24	48.20	303.3	11.64	18.20	29.84
'F' (55 meshes in depth)	24	47.07	305.5	7.90	15.16	23.06

* Average of 24 operations for each net.

TABLE II ANALYSIS OF VARIANCE

Source of Variation	Horizontal opening:				Tension in warps:			
	S.S.	D.F	M.S.	F.	S.S	D.F.	M.S.	F.
Total	34.3690	71			233036.32	71		
Between nets	0.5351	2	0.2676	4.91*	159.69	2	79.85	0.18
Between days	31.3258	23	1.3620	24.90**	212206.99	23	9226.39	20.53**
Error	2.5081	46	0.0545		20669.64	46	449.34	

highly significant, ($P < .01$). This might be due to the highly fluctuating conditions of the sea during the experimental period.

Conclusion

It is concluded from the above results that net 'E' has an optimum depth of belly as compared to nets 'D' and 'F'. Further, this investigation has shown that reduction of the belly depth beyond that of 'E' may be detrimental to the catching efficiency as well as the mechanical characteristics of the net as exemplified by 'F' with 55 meshes in depth.

Acknowledgement

The authors are grateful to Dr. A. N. Bose, former Director, Central Institute of Fisheries Technology, Ernakulam for the valuable encouragement given. They are highly indebted to Shri G. K. Kuriyan, Director-in-charge, for his most valuable support and having gone through the manuscript and making it presentable. They are also thankful to Shri H. Krishna Iyer, Assistant Fishery Scientist (Statistics), for his valuable help and co-operation in the statistical analysis of the data collected. Last but not the least they thank all the crew of Fishtech II from which the operations were carried out.

Reference

Mhalathkar, H. N and Iyer, H. Krishna, 1966 Belly depth studies for shrimp trawls – IPFC occasional paper 67/6.

TABLE III ANALYSIS OF VARIANCE

Source of Variation:	PRAWN CATCH				FISH CATCH				TOTAL CATCH			
	SS	DF	MS	F	SS	DF	MS	F	SS	DF	MS	F
Total:	9.3790	71	...	...	5.0302	71	...	...	5.5839	71	...	...
Between nets:	0.6340	2	0.3170	7.70**	0.2666	2	0.1333	2.79	0.6091	2	0.3045	5.95**
Between days:	6.8512	23	0.2978	7.23**	2.5628	23	0.1114	2.33**	2.6191	23	0.1139	2.22**
Error:	1.8938	46	0.04116	...	2 2008	46	0.0478	...	2.3557	46	0.0512	...

* Indicates significance at 5% level ** Indicates significance at 1% level SS sum of squares
DF Degree of freedom MS Mean square F Variance ratio