

The Effect of Mesh Size on the Fishing Efficiency of Sardine Gill Nets

K. M. JOSEPH & A. V. SEBASTIAN

Central Institute of Fisheries Technology, Cochin—5

[The study deals with the effect of mesh size on the fishing power of gill nets. The authors have shown that there can be substantial difference in the outputs of sardine gill nets, of identical design and rigging, but of different mesh sizes, operated under the same conditions.]

Introduction

From the stand-point of conservation of population, the selective action of the meshes in a gill net has been studied by many workers (Buchanan-Wollaston, 1927 ; Hodgson, 1927 ; Havinga and Deelder, 1949 ; Nomura, 1961 and Burd, 1963) with a view to determining the minimum widths of mesh. The effect of the size of mesh on the efficiency of the net, as distinct from its selectivity, though very important from the stand-point of production, has not received sufficient attention. The present paper reviews the results of a preliminary study undertaken by the authors during the 1963-64 season on the effect of different mesh sizes on the output of sardine gill nets on the Kerala coast.

Experimental Procedure

The data utilised for this preliminary study were collected from four nets made of Nylon 210/2/2, of identical dimensions and rigging, but of different mesh sizes. The mesh sizes are shown in Table I. Each net measured 10.4 m by 4.8 m. The nets were operated mostly during early hours of the day and occasionally during the night. The method of operation was surface drifting. During the operations, the nets were placed in juxtaposition as part of a fleet of 16 nets.

Results and Discussion

Table I shows the quantity, both in weight and number, of oil sardines taken by each net, as percentage of the total out-put of the four nets. The figures shown in the respective adjacent columns indicate the actual weight and number. Table II indicates the size composition of the total catch and of the catch taken by individual nets.

The term "efficiency" is used to compare the out-puts of two sets of fishing gear. According to Rummler (1954), 'efficiency' is not a precisely defined standard of measurement. von Brandt (1955) has pointed out that the term is useful as a standard, only if, instead of referring to the outputs of individual nets, it can be based on the proportion which a certain fishing net can take from a shoal of known magnitude. Cor-

rect estimation of the size of the shoal is difficult under ordinary circumstances. Therefore all that is indicated by 'efficiency' in the present paper is the output of one set of net as compared to that of another.

TABLE I. — The Quantity of Oil Sardines Caught by Different Nets.

Sl. No.	Mesh size (Bar length) mm.	Weight of Sardine		No. of sardines		Modal size length mm.
		% of total output	Actual weight	% of total output	Actual Number	
A	14.0	18.40	15.02	24.80	520	131 — 140
B	16.7	40.50	33.10	41.42	868	161 — 170
C	19.3	28.38	23.20	23.86	500	181 — 190
D	20.9	12.72	10.40	9.92	208	181 — 190

From Table I, it is seen that the net B (16.7 mm) contributed to 40.5% of the total output of the four nets. This amounts to more than 3 times and 2 times the catches taken by the net D (20.9 mm) and A (14.0 mm) respectively. The net C (19.3 mm.) took nearly 28% of the total output, i.e. about 2 times more than the quantity taken by the net D. Net D which had the biggest mesh, produced the poorest catch, while net A which had the smallest mesh, yielded comparatively better results.

TABLE II. — Indicating the Frequency Distribution of Length Groups of Oil Sardine Taken by Nets A, B, C & D

Size group (length) mm,	Total catch %	Net A %	Net B %	Net C %	Net D %
121 — 130	5.46	18.75	1.82	—	—
131 — 140	8.20	27.08	3.64	—	—
141 — 150	8.74	25.00	7.27	—	—
151 — 160	12.02	10.42	23.64	7.84	—
161 — 170	23.50	18.75	38.18	13.73	—
171 — 180	18.04	—	20.00	29.41	24.14
181 — 190	20.22	—	5.45	43.14	62.07
191 — 200	3.82	—	—	5.88	13.79

The size composition of oil sardines given in Table II, seemed to explain the difference observed in the outputs of the different nets. The modal length group represented in the total catch was 161-170 mm. The modal size taken by net B coincided with this, more than any other net. This explains the superiority shown by the net B. The modal size of net C namely 181 — 190 mm. corresponded to the next predominant size group in the total catch. Net A caught mainly the smaller length groups while Net D took only the larger ones. Although there was close similarity between the modal sizes of net C and D, the outputs of these two nets showed difference. Net C took 2 times more catch than net D. This suggests that the mesh size of net C was more suitable for the available size groups than the mesh size of net D.

When the output of the different nets are taken into consideration, it is obvious that the use of the mesh sizes 14.0 mm. and 20.9 mm. was not as economical as those of 16.7 mm. and 19.3 mm. during the 1963-64 fishing season in Cochin area. The data clearly illustrate that the success of fishing with gill nets for Oil Sardines depends mainly on the selection of optimal mesh size for the available size of fish in the fishery. This requires prior knowledge of the size groups that may enter the fishery each year.

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