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Selectivity of hake and horse-mackerel with trawl gears of
polyethylene and polypropylene in the fishery of Galicia

by

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Introduction

In the present paper, results of selectivity studies on hake and horse-mackerel are summarized. Those studies were carried out all along the Galician Coast specially between Cape Finisterre and the Miño River in depths ranging from 44 to 405 meters. The experiences were started in September 1970 and ended in July 1974.

Material and methods

The gear was a trawl of the type called "baca". A covered cod-end was used to conduct all the experiences. The cod-ends were 4 to 5 meters long and were made of polyethylene monofilament and polypropylene multifilament with a mesh opening of 27 and 32 mm and a length of 9 meters.

After the trawls, 40 to 50 meshes were measured with an ICNAF type calibrator with a strength of 5 kg. The trawls were carried out on board of 10 different commercial vessels of the type normally used in the bottom trawl fishery off Galicia. They

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had an overall length ranging from 24 to 32 meters, a GRT from 85 to 169, and a horse power from 130 to 470. The speed during the trawls was 2 to 3 knots and the average trawling time was one hour and a half.

The trawls were carried out in the Galician shelf specially between Cape Finisterre and the Miño River, in depths ranging from 44 to 405 meters. Catches were carried to the Vigo Laboratory of the Instituto de Investigaciones Pesqueras. The fish was preserved with melting ice in order to keep its humidity. Parts of the catch belonging to the cod-end and the cover were studied separately, classifying every single species, counting and weighing the total number for each one, and measuring the main commercial species.

The curves were freehand interpolated by three of the authors, and selecting for each case the one showing an intermediate 50% selection point (fig. 1 to 7).

Hake size was measured to the nearest centimeter from the tip of the snout to the end of the caudal fin (total size). Horse-mackerel was measured to the nearest half centimeter from the tip of the snout to the central point of the line joining the two lobes of the caudal fin (total bilobular size).

Results

In tables 1 and 2 some data referent to the experiences are shown, as well as the selection factors for hake and horse-mackerel. It seems to happen for polyethylene in both species that there exists a possible positive correlation between the selection factor and the mesh size.

The resultant selection factors are for polypropylene; 3.46 for hake and 3.81 for horse-mackerel, and for polyethylene the average of the selection factors are 2.8 for hake and 3.1 for horse-mackerel.

Discussion

There is an evident difference between the selectivity of the polyethylene monofilament fibers and those of polypropylene, having the latter a bigger selection factor. Polypropylene threads are more flexible and soft than those of polyethylene. These characteristics approach polypropylene threads to those of polyamides, but polypropylene was considered in the ICES/ICNAF Report (1971) in the group of materials having a low selection factor.

MONTEIRO (1964) using polyamide gears for the portugese hake found a selection factor of 3.6, and DARDIGNAC et al (1967) using polyamide gears found for the Galician hake selection factors ranging from 3.2 to 3.9. Preliminary results of selectivity experiences in our coast show a selection factor of 3.97 for hake. Thus we can see that the value of the selection factor for polypropylene 3.46 comes close to those found for polyamide.

The selection factor for horse-mackerel (3.1) using polyethylene is similar to that of 3.3 given by LARRAÑETA, SUAU and SAN FELIU (1969) for the Mediterranean horse-mackerel.

Observing the selection curves for polyethylene. It seems that there is a possible positive relationship between the selection factor and mesh opening. This kind of relationship has been already pointed out for some authors, ARANA (1970) with polyamide, and LARRAÑETA et al (1969) with polyethylene and polyamide.

It can be observed that there is a certain difference in the slope of the polyethylene selection curves. JONES (1963) find as the only one reasonable explanation that the mesh-shape varies in the different parts of the cod-end depending on the flux of the water, which should depend on the shape of the gear.

We can say that at least it does not depend on differences in mesh-size within the cod-end.

Summary

In the period from September 1970 to July 1974 a total of 33 trawls have been carried out in the demersal fishery of Galicia. The gear used was a trawl of the type called "baca" with a covered cod-end, in order to study the selectivity of hake (Merluccius merluccius) and horse-mackerel (Trachurus trachurus) using nets of polyethylene monofilament and polypropylene multifilament. The selection factors were the following

hake, polyethylene.	2.8
hake, polypropylene	3.46
horse-mackerel, polyethylene. . . .	3.1
horse-mackerel, polypropylene . . .	3.81

Thus, polyethylene nets show lower selection factors than those of polypropylene.

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Table 1

Data of selectivity experiencies on hake using polyethylene monofilament and polypropylene multifilament (pp. mult) nets

	<u>Polyethylene monofilament</u>			<u>pp. mult.</u>
Mesh opening (mm)	53	67	74	48
Number of trawls	7	9	8	9
Total trawling time	11h 04m	13h 55m	14h 00m	11h 03m
Months of experiencies (1-12)	2-3-9-11	3-7-10-11	2-5-7-9	4-9-10-12
Limit sizes of the selection interval 25-75% (mm)	110-140	150-210	210-280	140-190
Selection size 50% (mm)	128	177	242	166
Selection factor	2.42	2.64	3.27	3.46
Number of fish in the 25-75% interval	10764	2341	759	2309
Weight of other animals in the cod-end (kg)	1508	952	553	3016

Table 2

Data of selectivity experiencies on horse-mackerel using polyethylene monofilament and polypropylene multifilament (pp. mult) nets

	<u>Polyethylene monofilament</u>		<u>pp. mult.</u>
Mesh opening (mm)	53	67	48
Number of trawls	7	9	9
Total trawling time	11h 04m	13h 55m	11h 03m
Months of experiencies(1-12)	2-3-9-11	3-7-10-11	4-9-10-12
Limit sizes of the selection interval 25-75% (mm)	135-155	210-245	155-205
Selection size 50% (mm)	146	228	183
Selection factor	2.75	3.40	3.81
Number of fish in the 25-75% interval	309	955	2916
Weight of other animals in the cod-end (kg)	1687	867	1968

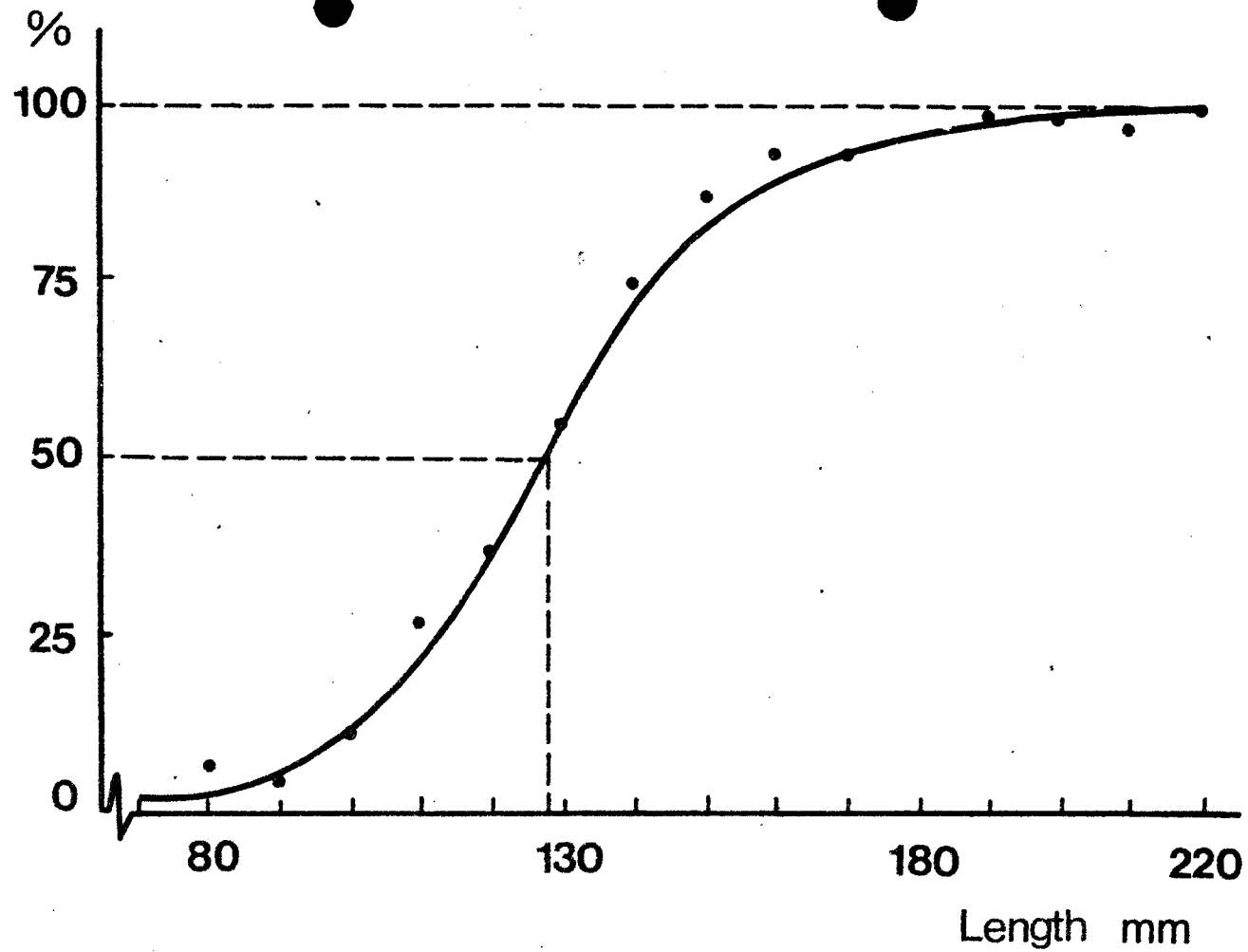


FIG. 1 - Selectivity curve for hake with polyethylene nets of 53mm mesh size.

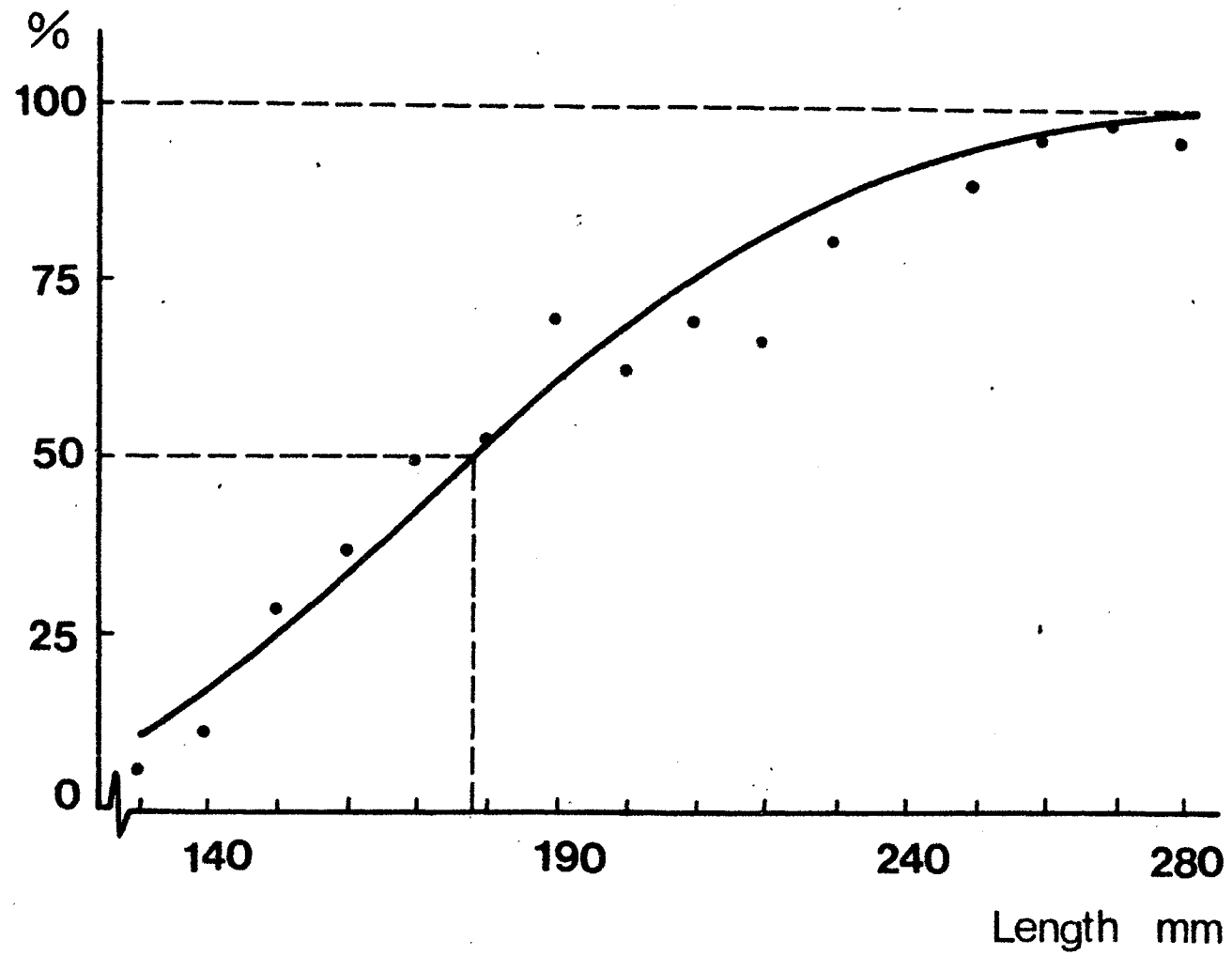


FIG. 2 - Selectivity curve for hake with polyethylene nets of 67mm mesh size.

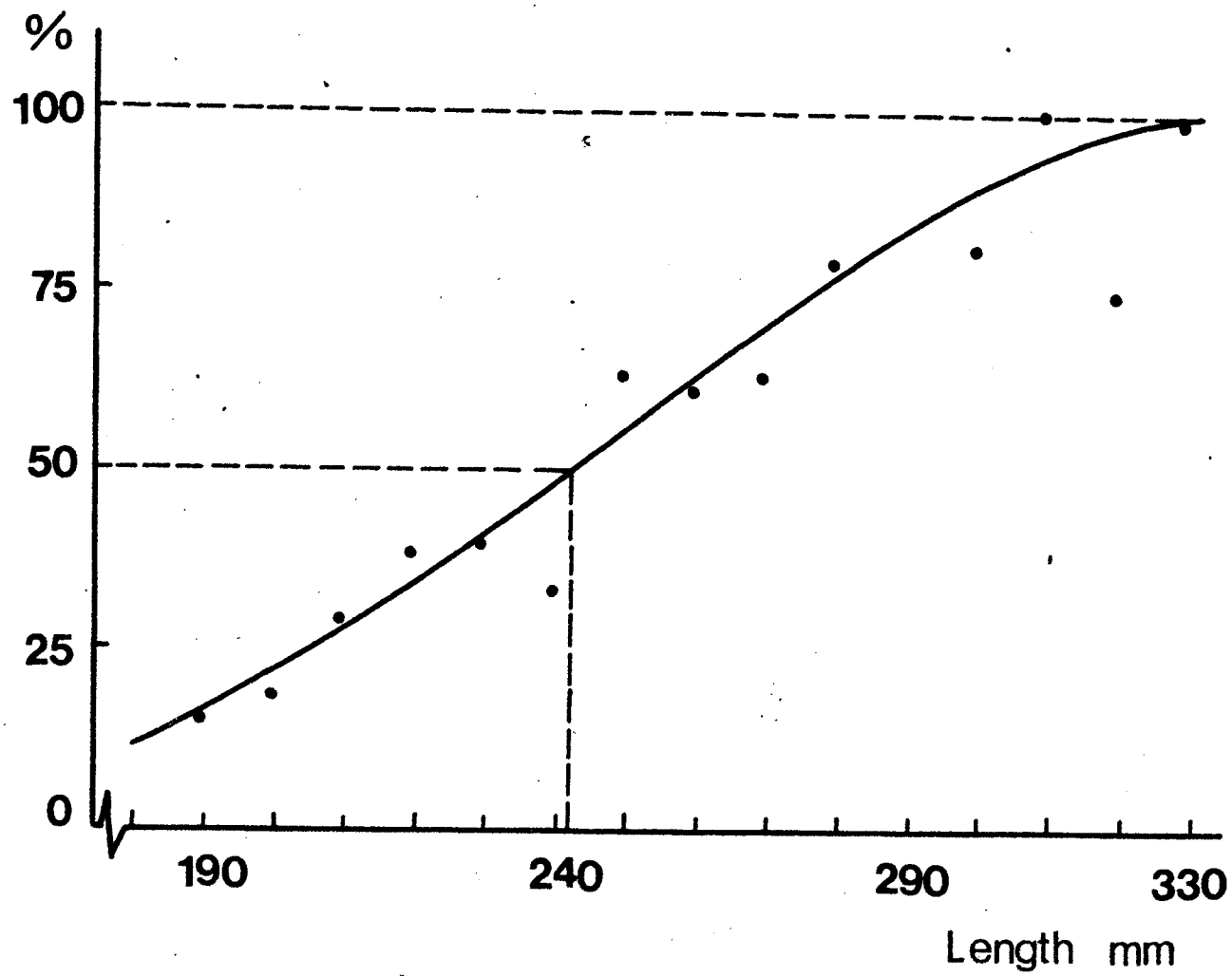


FIG. 3 - Selectivity curve for hake with polyethylene nets of 74 mm mesh size.

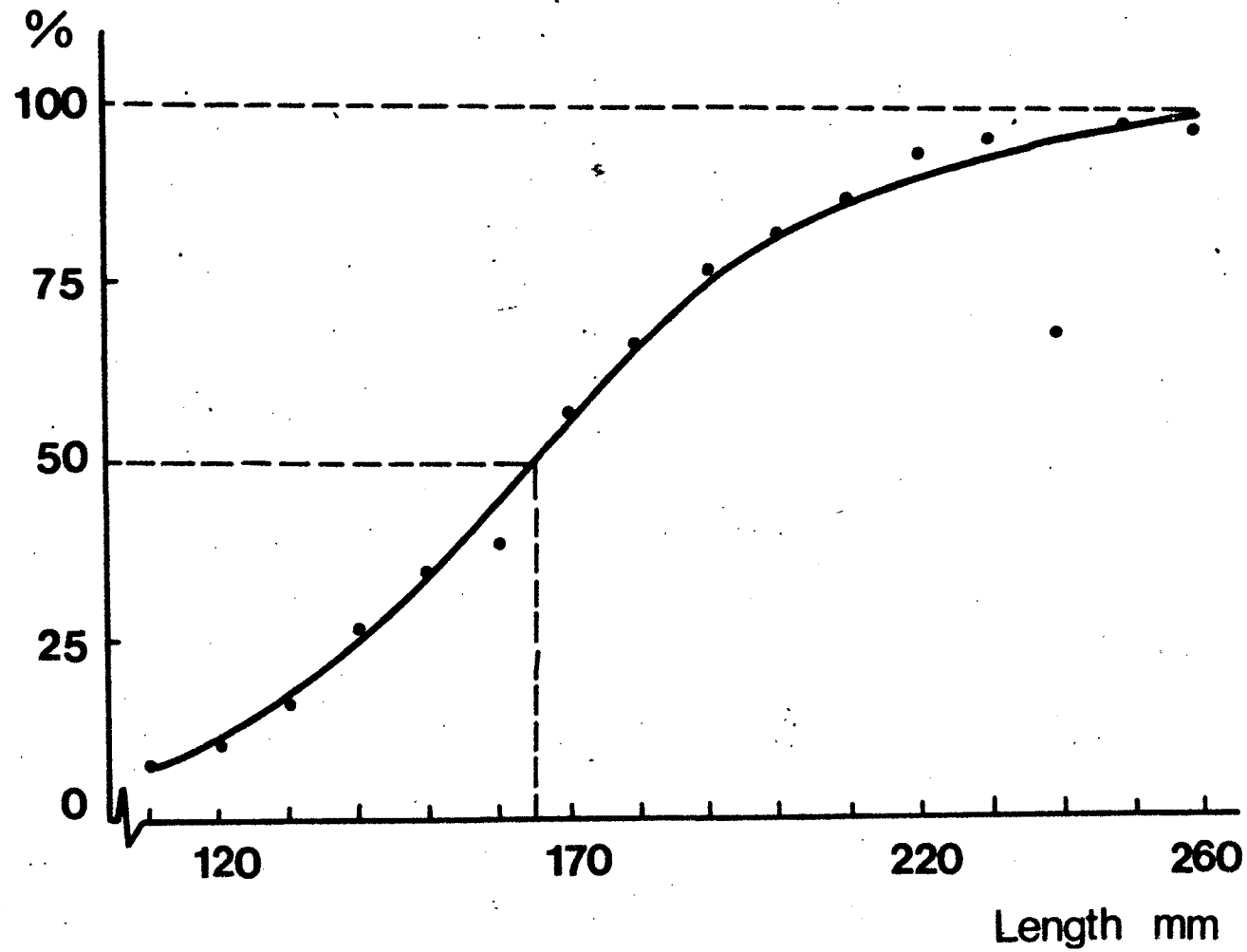


FIG. 4 - Selectivity curve for hake with polyethylene nets of 48mm mesh size.

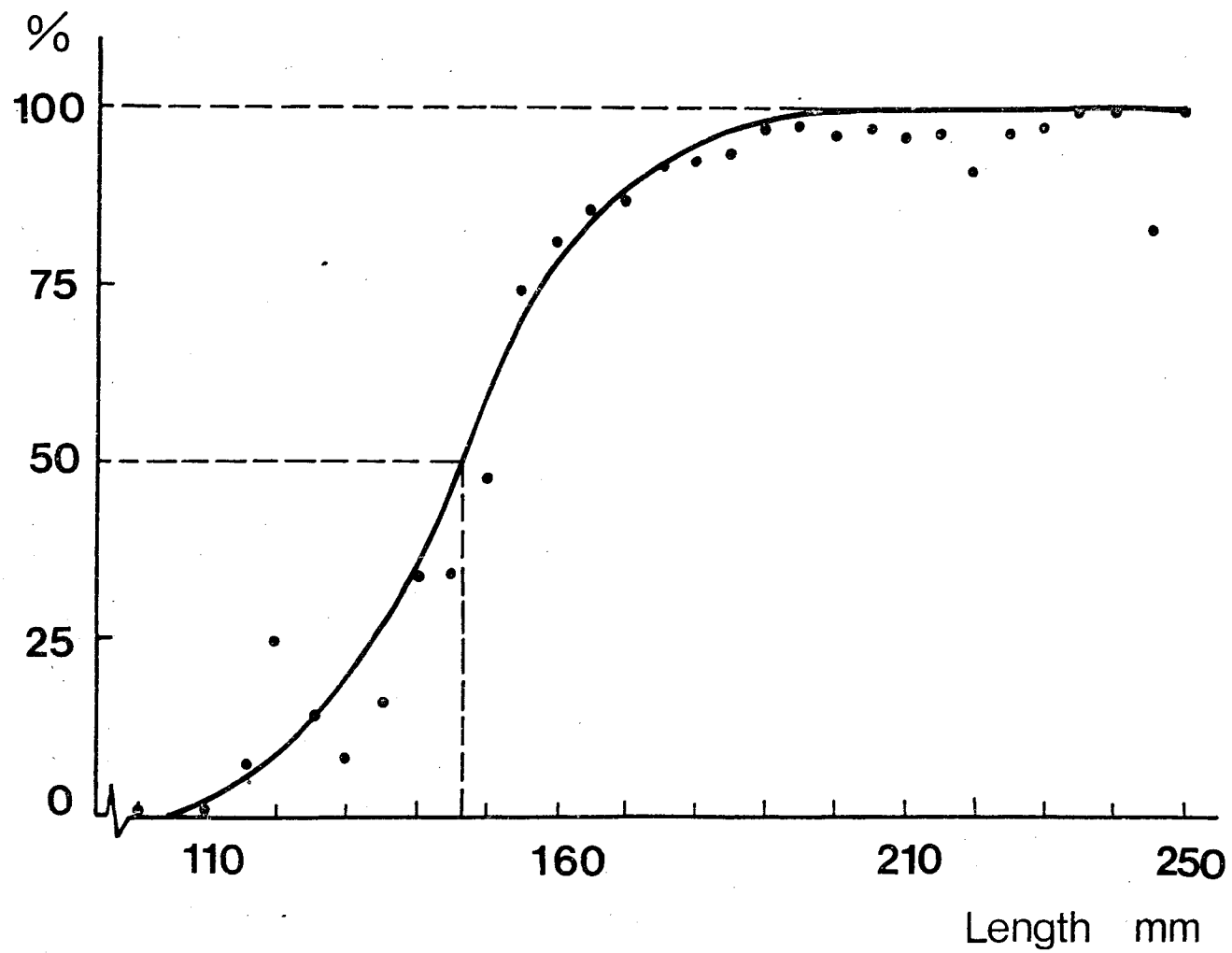


FIG. 5 - Selectivity curve for horse-mackerel with polyethylene nets of 53 mm mesh size.

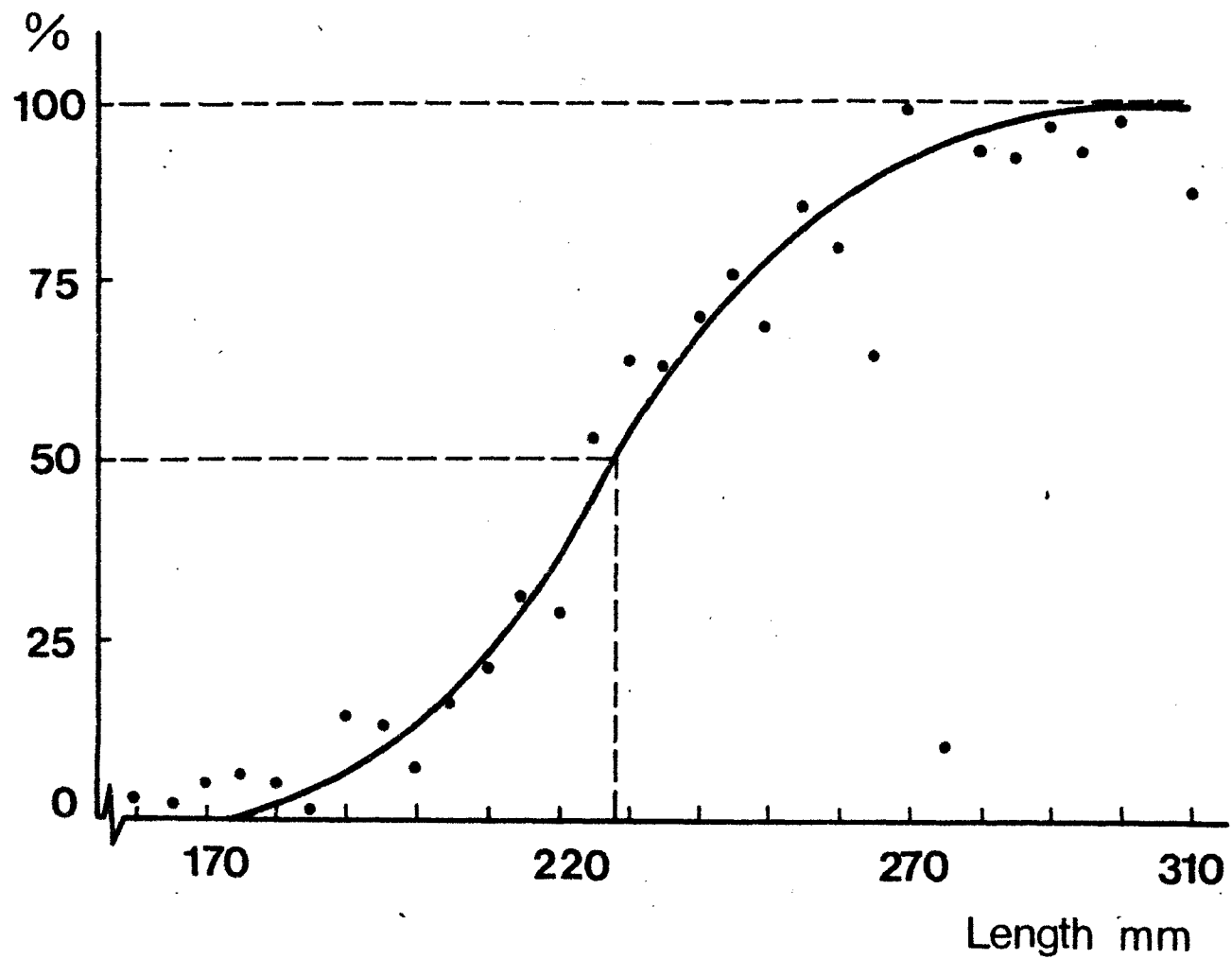


FIG. 6 - Selectivity curve for horse-mackerel with polyethylene nets of 67 mm mesh size.

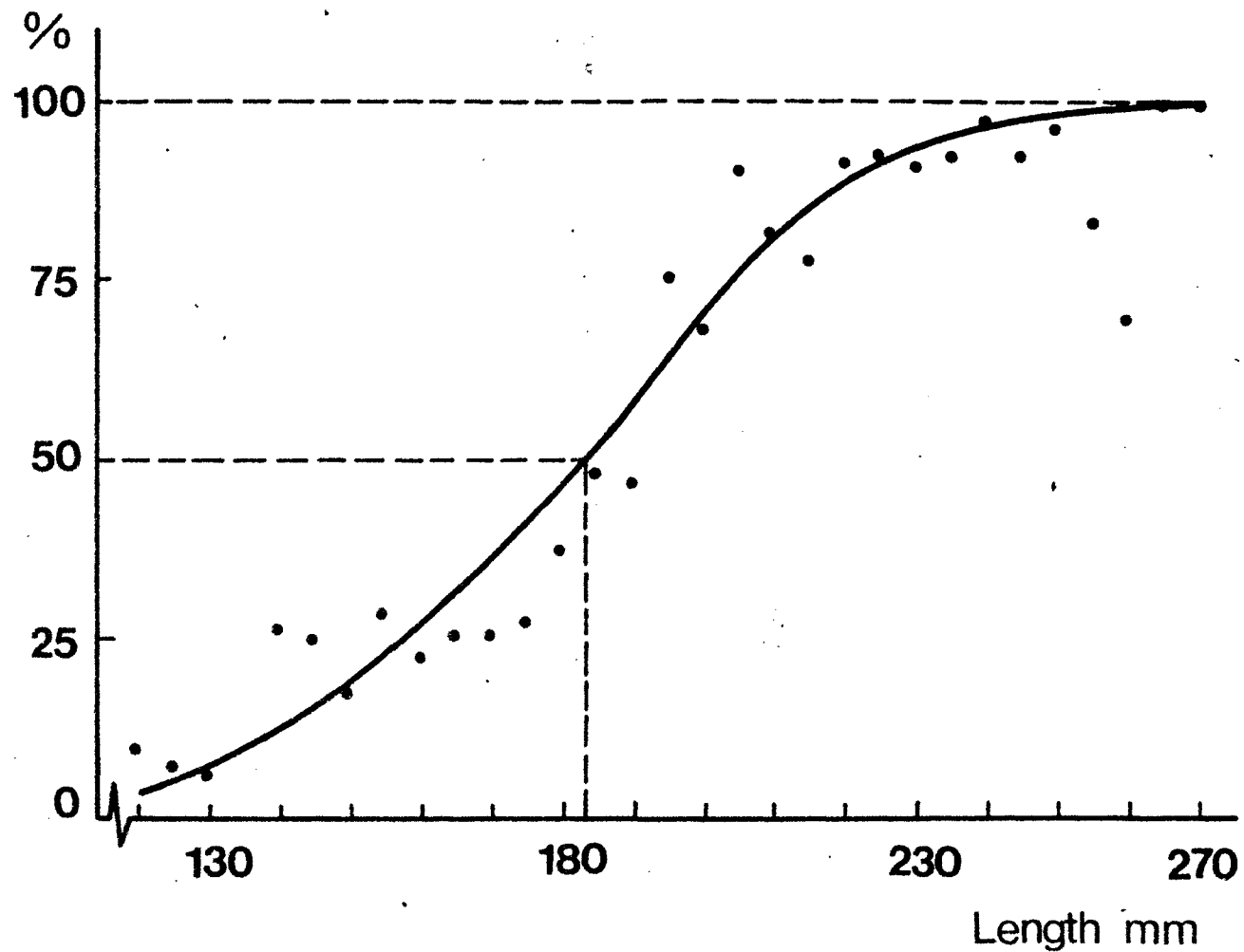


FIG. 7 - Selectivity curve for horse-mackerel with polyethylene nets of 48 mm mesh size.