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Selection of silver hake by kapron codends of trawl nets

by

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Introduction

A selectivity study was carried out from August 5 to 18, 1977 on board of the R/V *Isla de la Juventud*. This study was made on the Scotian Shelf, in the area between LaHave Bank and the south of Sable Island. The objective of the study was to add some new information on codend mesh size, taking into account what was stated in the legislation of December 1976.

The silver hake fishery on the Scotian Shelf began during the first half of the 1960's. It increased rapidly, reaching 300,000 metric tons at the beginning of the 1970's. It should be noted that during all these years the main fleet operating in the area was the USSR one. Last year the Japanese and Cuban fleets have taken an active part in the fishery.

Materials and Methods

In the fishing operations the commercial 41.6 m headrope trawl, as described in the fishing gear manual of the Cuban fishing fleet was used. This commercial net, made in Spain, is the one commonly used by the commercial Cuban vessels in their fishing operations.

Three kapron codends measuring 40 mm, 60 mm, and 90 mm were used during the experiment. During the experiment the covered codend method was used. The cover used was of 20 mm mesh to assure the retention of all fishes passing through the codend while avoiding an excessive weight of fish which could break the cover.

Codend mesh size was measured using the gauge described by Clark (1963) and recommended by ICNAF. The resulting measurements are shown in Table 1.

The original experimental design was based on a latin square, being the number of working days an exact multiple of the number of nets used. This design allowed the trawls to be fished during different periods of the day, and making the statistical analysis easier. As often happens in many experiments at sea, this design was changed in amount to the low silver hake catches reported, which did not allow to obtain adequate samples. To obtain silver hake samples to determine length frequencies, it was decided to make four trawls of 2.5 hours, with each mesh size. In some cases, the trawling time was shortened if great concentrations of silver hake or squid were registered by the echosounder.

If the samples were inadequate after these four trawl hauls with each mesh size, the hauls were reported until an adequate length composition was obtained for each codend and cover.

Thirty hauls were made, mainly to the south of the Sable Island area where the adult schools traditionally concentrate to spawn.

During the first fortnight of August, the silver hake became scarce and it was necessary to move to the west to finish the work.

The specifications of the gear used are given in Table 1. The method proposed by Holden (1974) and Pope (1975) was used to fit the selection curve, i.e. the method of maximum likelihood. This method allows us to estimate efficiently the parameters for the selectivity curve.

The fish were measured to the nearest 0.5 cm using the total length.

Results

Table 2 gives the 50% retention length, the selection ranges and the selection factors for each of the three mesh sizes used in the experiment.

Table 3 compares the results obtained in the present experiment with those found by other authors for *Merluccius bilinearis* and *Merluccius merluccius*.

The curves found by Jensen and Hennemuth (1966) were plotted in probabilistic paper and compared with the ones obtained in this paper. It was noted that the selection range tended to increase with increasing codend mesh size (Fig. 1 and 2).

Selection curves for each codend mesh size are given in Fig. 3, 4 and 5. In all cases the curve fitted can be represented by the logistic.

The results show that the selection factor varied from 3.0 to 4.5. For a given mesh size the nylon allows escapement, cotton and intermediate amount and manila the smallest [Clark (1963)]. This suggests the existence of a relation between flexibility and escapement, that the more flexible material allows the greater escapement.

Figure 2 shows that the selection range for kapron is wider than that for nylon. This is to be expected, if we consider that kapron has an elongation factor \approx 50% higher than that for nylon [Holden (1971)].

Taking into account the amount of data available, more selectivity studies should be carried out in the near future.

References

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Table 1. Gear specifications for the bottom trawl net used in the R/V *Isla de la Juventud*.

Type of trawl:	Spanish bottom trawl	
Foot rope length:	57.9 m	
Head rope length:	41.6 m	
Head rope height:	6 m	
Wing spread:	unknown	
Length bridles:	113 m	
Type of doors:	Oval	
Door weight:	1500 Kg	
Door area:	5.5 m ²	
Mesh size in wings:	Dry - 204 mm;	Wet - 204 mm
Mesh size in body - square:	Dry - 200 mm;	Wet - 200 mm
- middle:	Dry - 150 mm;	Wet - 150 mm
- end:	Dry - 123 mm;	Wet - 123 mm

Mesh size in codend:

<u>40 mm</u>		<u>60 mm</u>		<u>90 mm</u>	
<u>Dry</u>	<u>Wet</u>	<u>Dry</u>	<u>Wet</u>	<u>Dry</u>	<u>Wet</u>
40.1 mm	40.1 mm	66.1 mm	66.1 mm	90.0 mm	90.0 mm
	40.2 mm		66.2 mm		90.2 mm
			66.1 mm		90.2 mm
			66.1 mm		90.2 mm

Liner in codend:	Yes (covering the codend knot)
Mesh size in cover:	Dry - 20 mm; Wet - 20.1 mm
Chafing gear fitted:	Yes
Rollers on footrope:	No

Table 2. Mesh size, selection factor, selection range and 50% retention of Kapron codends

Mesh size	50% Retention Point (cm)	Selection Range 25% - 75% (cm)	Selection Factor
40 mm	10.1*	3.9 (16.2-20.1)	4.5
60 mm	19.0*	7.3 (15.3-22.6)	3.2
90 mm	27.7	12.7 (21.3-34.0)	3.0

* Fitted by maximum likelihood.

Table 3.

Species & Author	Year	Mesh Size	Section Factor	Material of Codend
Silver hake (Jensen and Hennemuth)	1966	52	5.08	Nylon
		73	4.16	Nylon
European hake (Alonso-Allende <i>et.al.</i>)	1976	61	3.97	Polyamide
		51	3.48	Polyamide
European hake (Vázquez <i>et.al.</i>)	1975	53	2.42	Polyethylene
		67	2.64	Polyethylene
		74	3.27	Polypropylene
		48	3.46	Polypropylene
Silver hake (this study)		40	4.5	Polyamide
		60	3.2	Polyamide
		90	3.0	Polyamide

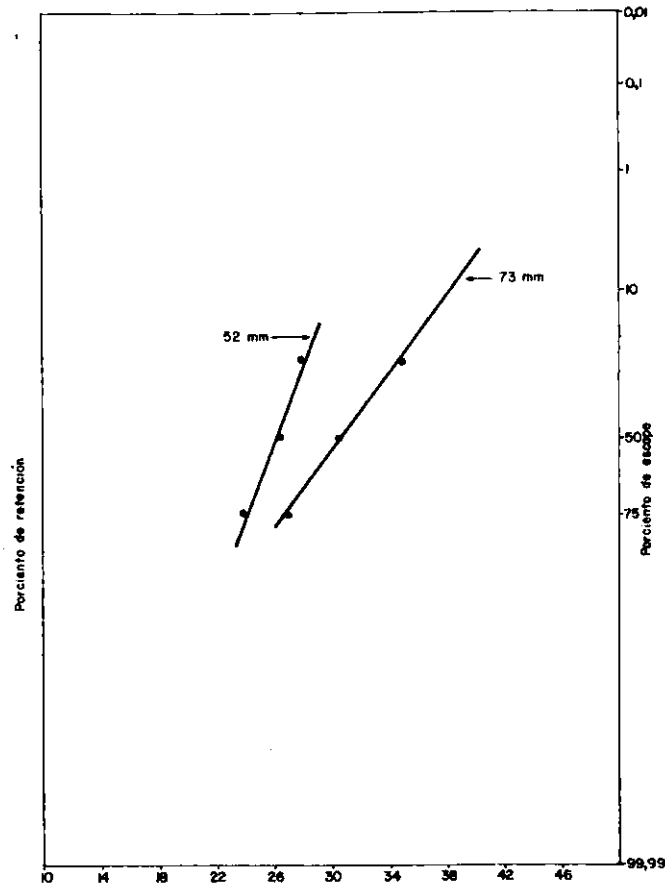


Fig. 1. Selections ogives for nylon codends (Jensen and Hennemuth).

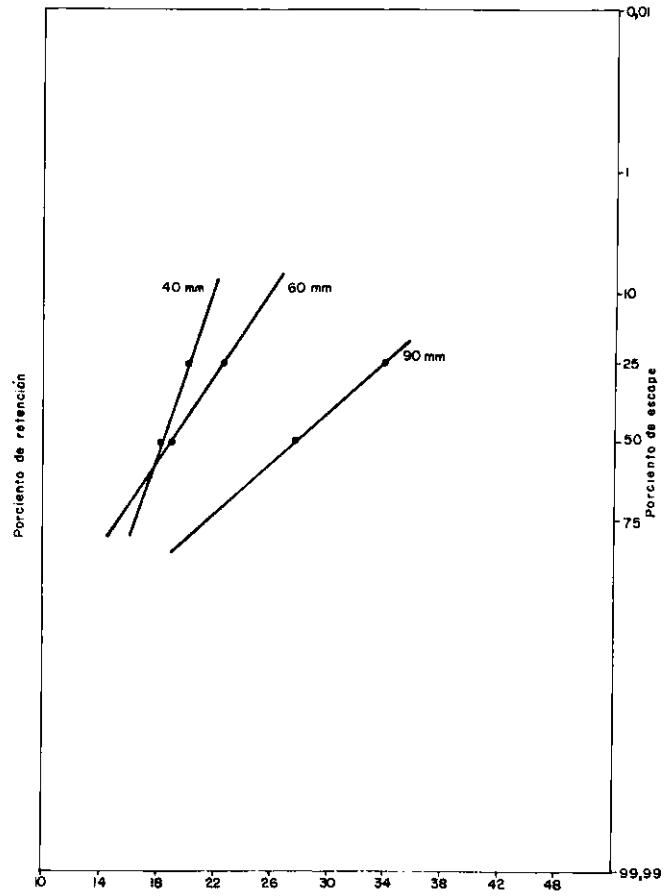


Fig. 2. Selection ogives for kapron codends (this (1977) study).

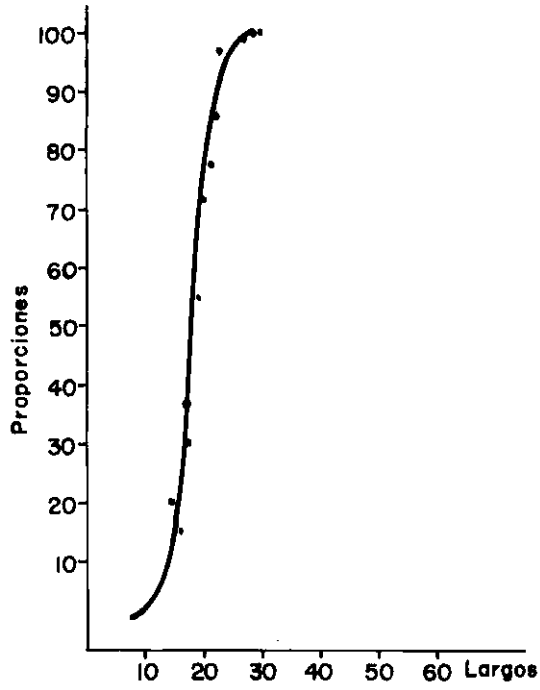


Fig. 3. Selection curve for silver hake (40 mm codend).

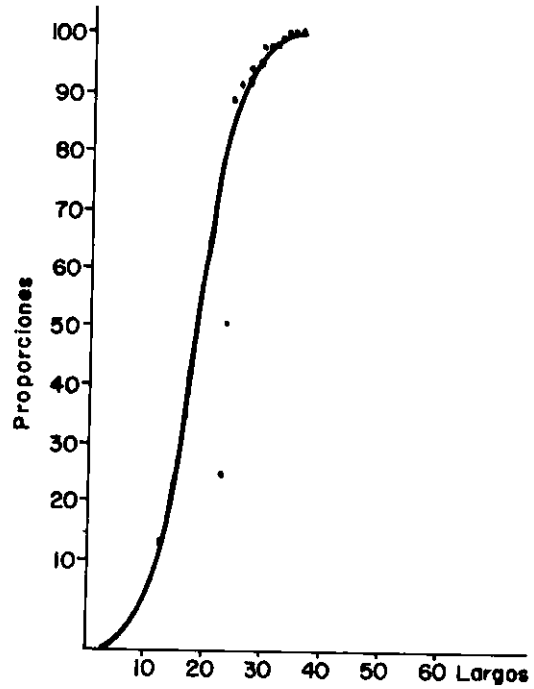


Fig. 4. Selection curve for silver hake (60 mm codend).

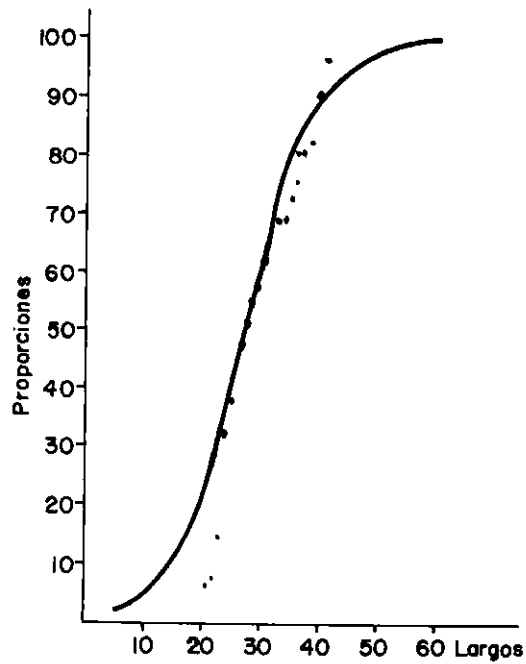


Fig. 5. Selection curve for silver hake (90 mm codend).