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Mean length and mean weight for age-groups 3 to 10+ of  
Greenland cod living in Div. 1A to 1D and Div. 1E to 1F

by

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In the report of the Assessment Subcommittee of the 1972 Annual Meeting (ICNAF Red Book 1972, Part 1) on page 20 cod assessments were made for the first time separately for Divisions 1A - 1D and Divisions 1E - 1F. It was expressed however that "the greatest uncertainty in the present calculation seems to be connected with mean weight at the various ages". The following mean weights were taken for the 1971 calculations:

Age	3	4	5	6	7	8	8+
Mean weight (kg)	0.62	1.18	2.1	2.7	3.0	3.0	5.5

In the mean time the German samples taken off West Greenland during the last 8 years from 1965 to 1972 were worked up in respect to mean length and mean weight at the various ages. The samples are from

- research ships fishing with small meshed nets
- research ships fishing with commercial trawl (110/130 mm)
- commercial trawlers, samples taken on board before discarding
- landings of commercial trawlers

For the age groups 3 to 6 only samples from a), b), and c) were used. For age groups 7 and more all samples were used. That we are allowed to proceed in this way is shown in Tables 1 and 2. The effect of the selectivity of different mesh sizes on the mean length is only very small for the age groups 3 to 6. This results from extensive mesh selection experiments carried out in November 1965 in Division 1B by Bohl with R.V. "Walther Herwig". As can be seen from Table 1 the differences in mean length of catches with small meshed nets and nets with 114.4 or 125.4 mm mesh size are 1.1 to 1.3 cm for age group 3. They decrease gradually to zero in age group 6, which means that in November at the end of the 7<sup>th</sup> feeding period all 6 years old cod are retained by commercial nets with a mesh size of at least 125.4 mm Perlon.

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The effect of discarding on the resulting mean length of the landed catch is of course far bigger than the effect of selectivity of different mesh sizes. This holds especially true for the younger year classes. Fishing with 125.4 mm Perlon and then discarding up to 60 cm would change the mean length of the younger year classes as shown in Table 2.

Table 1

Mean lengths of <sup>(cm)</sup> cod age groups 3 to 6 fished with 4 different mesh sizes

age	3	4	5	6
114.4 mm Polyäthylen with cover (60 mm)	40.4	48.8	60.6	67.6
114.4 mm Polyäthylen without cover	41.7	49.4	60.7	67.6
125.4 mm Perlon with cover (60 mm)	40.5	50.0	60.5	67.7
125.4 mm Perlon without cover	41.6	50.4	60.7	67.7
difference in mean length in cm	1.1-1.3	0.4-0.6	0.2-0.1	0.0

Table 2

Influence of discarding on resulting mean length (cm)

age	3	4	5	6
no discarding	41.6	50.4	60.7	67.7
discarding 41 cm and smaller	44.6	50.7	60.7	67.7
discarding 44 cm and smaller	46.6	51.5	60.7	67.7
discarding 47 cm and smaller	-	52.5	60.7	67.7
discarding 50 cm and smaller	-	54.7	60.8	67.7
discarding 53 cm and smaller	-	57.7	61.1	67.7
discarding 56 cm and smaller	-	59.4	61.7	67.7
discarding 59 cm and smaller	-	61.5	63.5	67.7

This means: if all fish of 60 cm and more of a catch in 1B in November are retained, all 3 years old cod are discarded. Of the 4 years old fish 97% are discarded and the retained 4 years old fish have a mean length of 61.5 cm. Of the 5 years old cod 52% are discarded and the mean length of the retained cod increases to 63.5 cm. No cod 6 years and older are discarded.

The normal practice on board of the fresh-fish trawlers (d)-samples) was to retain only cod of at least 60 cm, to-day with the smaller catches this limit-line is round about at 55 cm. In respect to the fact, that the growth of the cod in the southern Divisions 1E-1F is somewhat smaller than in Division 1A-1D only the mean lengths of the 7 years and older cod from the samples of the landings of the fresh fish trawlers were used for the calculations.

Table 3

Mean length and mean weight by age groups of cod in Divisions 1A-1D and 1E-1F according to German sampling in 1965 to 1972 and weighted to international monthly catches in 1970

age	3	4	5	6	7	8	9	10	10+
Div.1A-1D mean length (cm)	39.6	48.9	59.0	67.5	73.8	76.5	80.4	85.3	~ 90.0
" mean weight (kg)	0.58	1.08	1.94	2.80	3.60	3.98	4.63	5.48	6.23
Div.1E-1F mean length (cm)	35.5	44.5	51.3	58.3	66.4	71.1	75.9	82.6	~ 90.0
" mean weight (kg)	0.41	0.82	1.27	1.88	2.68	3.25	3.90	5.02	6.23

Table 3 is based on 159 samples from German research ships and commercial vessels with 176 044 measurements and 36 026 age determinations taken in Divisions 1B to 1F in 1965 to 1972. To get the best realistic mean length of the international yearly catch the average of monthly mean length figures were weighted with the monthly international catches of the year 1970, the latest year for which monthly figures were available and which represents best the recent seasonal distribution of the fishery.

To get the corresponding mean weight figures the weight which corresponds to the different mean length figures was taken from the "German Length-Weight-Data"-list prepared as "ICNAF Res.Doc. 66-18, Appendix" for the meeting of the Greenland Cod Working Group in Copenhagen, February 1966. To this weight figure found in the length-weight-data-list a small value of round 2.2 to 3.4%, which was empirically found, was added.

Table 3 shows clearly that there exists a considerable difference in growth between the quicker growing West Greenland stock which mainly is living in Divisions 1A-1D and the slower growing East Greenland stock, which in Subarea 1 mainly inhabits Divisions 1E-1F. The real difference in growth between the 2 stocks however is a little bit smaller, for the mean length figures in Table 3 resulted from weighting to the international catch and in the southern divisions the catch is taken round about one month earlier than in the north. If the fishing pattern in the southern divisions would have been the same as in the northern divisions the mean lengths in the two areas would be as follows (Table 4).

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Table 4

Mean lengths (cm) by age groups with equal fishing pattern  
in Division 1A-1D and Division 1E-1F

age	3	4	5	6	7	8	9	10	10+
Div.1A-1D	39.6	48.9	59.0	67.5	73.8	76.5	80.4	85.3	~90.0
Div.1E-1F	36.3	44.7	51.8	58.7	66.9	71.1	75.7	82.6	~90.0
Difference	3.3	4.2	7.2	8.8	6.7	5.4	4.7	2.7	

The difference in growth between both stocks increases up to nearly 9 cm in age group 6. This 9 cm is more than the increase in length within one year. This means that 5 and 6 years old cod of the West Greenland stock reach their length more than one year earlier than the East Greenland cod. However this difference in length between the cod of the two stocks decreases gradually in older age groups (see Table 4), for the onset of maturity in East Greenland cod with 7 to 9 years is round about 2 years later than in the West Greenland stock. Thus because of the longer span of immature life (with higher yearly growth rate than during the mature phase) of the East Greenland stock older cod of both stocks of 10 and more years have nearly the same length.