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Coefficients of Yield and Waste of the Greenland Cod.

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(English summary of a paper by J. Mouzinho de Figueiredo: "Indices de Aproveitamento do Bacalhau a Bordo" forwarded to Headquarters by the Comisao Consultiva Nacional das Pescarias do Noroeste do Atlantico, Portugal.)

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The paper deals with weighings of the separate parts of the cod as they are processed on board.

The weighings were carried out by the author himself on board the Portuguese dory fishing vessel "Capitao Joao Vilarinho" during fishery in Greenland waters in June-July 1953.

A total of 80 cod were investigated, 53 from Fyllas Bank and 27 from Store Hellefiske Bank.

The methods used in the research and the difficulties in connection with the work are described. Especially mentioned are the difficulties in getting accurate results arising from the oscillations of the scales caused by the movements of the vessel.

The extent of the researches and their results up to the moment when the fish body is transferred to the hold of the vessel for salting appear from the attached tables.

12 separate weighings from each of the 80 cod were made; possible deficiencies of the work or errors in the weighings are discussed.

The "Weight of entire fish as out of sea" is strictly speaking not the weight of the living fish, but a little less as there is loss of blood from the wound made by the hook and, in cases a loss of stomach contents from vomiting before weighing. As losses of the same kind may occur also during the later weighings and to a varying extent from specimen to specimen, a complete congruity between the sums of the separate weighings and the end result cannot always be achieved. Under the terms "undetermined waste" in the tables are indicated the calculated losses of this kind not accounted for by direct weighings.

The "total head with ventral entrails" may vary considerably from specimen to specimen owing to variations in loss caused by vomiting. Livers and ovaries were weighed separately, whereas the male sex organs were not accounted for.

As the weighings were carried out 2-3 months after the spawning season no difficulties were met in weighing the ovaries as would have been the case if the weighing had taken place in a period with running roe.

The term "waste of head" is calculated by subtracting weight of cheeks and tongues from weight of total head.

The term "total waste" is calculated as the sum of weights of materials rejected (head, entrails(excl. liver), roe, anterior 1/3 of backbone and "undetermined wastes"). "Total recovered" is the sum of body ready for salting plus cheeks and tongues, livers and airbladder.

"Total loss v. recovered body" is the weight of fresh round fish less weight of body ready for salting.

Finally the "ratio fresh round/body ready for salting" is the figure by which the weight of body ready for salting shall be multiplied to get the weight of fresh round fish; it is the conversion factor to be used for fish ready for salting.

The losses in weight of the fish body from the moment of capture (fresh round fish) until the transfer of the fish bodies to the hold of the vessel amount to a total of 27%, varying little only in the 4 categories (males and females from the two banks), from 26.1 to 28.2%. This total loss is made up by the following items: head 11%, anterior 1/3 of backbone 6.5%, entrails (excl. liver and roe) 8.5%, and undetermined wastes 1.3%.

The question of a possible utilization (as fishmeal, oil or otherwise) of these wasted products is discussed. It is mentioned that in cases some of these products are already used. The fact that space on board is very limited makes it difficult to use these by-products.

The "conversion factor" for body ready for salting - not the conversion factor for unloading - varies only little from males to females and between the two banks. The sizes of this factor for the 4 categories of cod are the following; the numbers in ( ) denote numbers of specimens:

	Fyllas Bank	Store Hellefiske Bank
Males	1.69% (24)	1.76% (10)
Females	1.72% (29)	1.71% (17)

Mean 1.73%

The corresponding factor calculated from the results of the weighings on board 17 Portuguese fishing vessels fishing in more or less the same areas in the same year (see Document 3) is 1.66. This figure is thus very close to those found in the present investigation. The two series of researches not only control one another, but confirm mutually the results achieved.

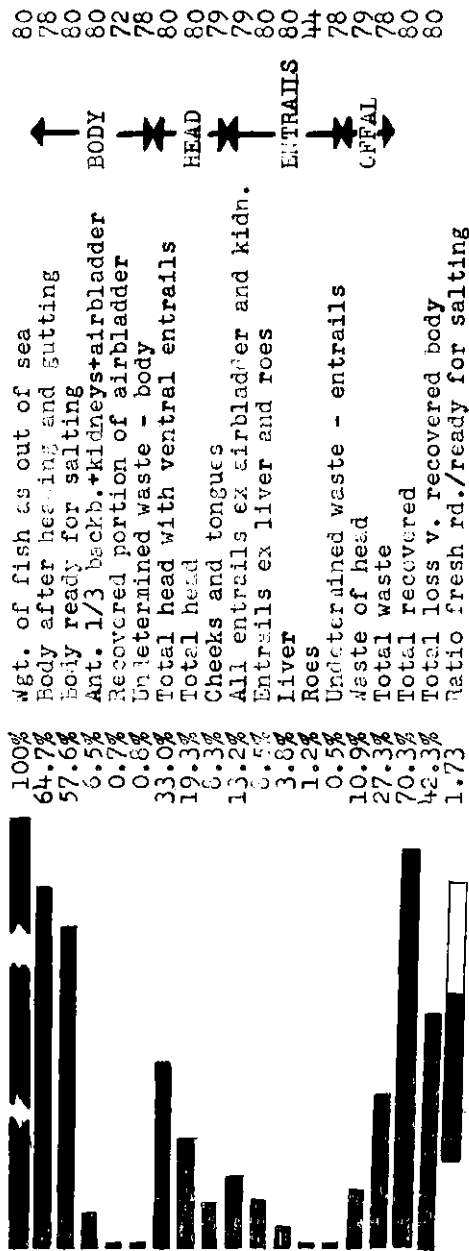
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PORTUGAL - SUBAREA 1 - STORE HELLEFISKE and FYLLAS BANKS - June and July 1953

Average % Yield and Waste of the Greenland Cod

80 fishes from 0.60 to 1.07 m. length

34 Males and 46 Females



100%

Average length of the fishes: 0.82

PORTUGAL - SUBAREA 1 - STORE HELLEFISKE BANK - July 1953

Average % Yield and Waste of the Greenland Cod

	10 Males (from 0.71 to 1.03 m. length)	17 Females (from 0.71 to 1.07 m. length)
Wgt. of fish as out of sea	100%	100%
Body after heading and gutting	65.0%	64.4%
Body ready for salting	56.9%	57.4%
Ant. 1/3 backb.+kidneys+ airbladder	6.4%	6.1%
Recovered portion of airbladder	0.7%	0.7%
Undetermined waste - body	0.9%	0.9%
Total head with ventral entrails	32.9%	33.4%
Total head	19.4%	19.7%
Cheeks and tongues	8.0%	8.5%
All entrails ex airbladder and kidney	12.9%	13.0%
Entrails ex liver and roes	9.7%	8.3%
Liver	2.8%	3.5%
Roes	-	1.1%
Undetermined waste - entrails	0.4%	0.6%
Waste of head	11.3%	11.1%
Total waste	28.2%	27.6%
Total recovered	68.5%	70.1%
Total loss v. recovered body	43.0%	42.5%
Ratio fresh rd./ready for salting	1.76%	1.71%

Average length of the fishes: 0.85

PORTUGAL - SUBAREA 1 - FYLLAS BANK - June 1953

Average % Yield and Waste of the Greenland Cod

24 Males  
(from 0.60 to 0.90 m. length)

100%	Wgt. of fish as out of sea
65.9%	Body after heading and gutting
58.6%	Body ready for salting
6.5%	Ant. 1/3 backb.+kidneys+airbladder
0.8%	Recovered portion of airbladder
0.9%	Undetermined waste - body
31.9%	Total head with ventral entrails
19.1%	Total head
8.0%	Cheeks and tongues
12.4%	All entrails ex airbladder and kidneys
8.2%	Entrails ex liver and roes
4.0%	Liver
-	Roes
0.4%	Undetermined waste - entrails
10.7%	Waste of head
26.1%	Total waste
71.7%	Total recovered
41.3%	Total loss v. recovered body
1.69%	Ratio fresh rd./ready for salting

29 Females  
(from 0.64 to 1.06 m. length)

100%	Wgt. of fish as out of sea
63.3%	Body after heading and gutting
57.7%	Body ready for salting
7.2%	Ant. 1/3 backb.+kidneys+airbladder
0.8%	Recovered portion of airbladder
0.7%	Undetermined waste - body
33.5%	Total head with ventral entrails
19.0%	Total head
8.5%	Cheeks and tongues
13.7%	All entrails ex airbladder and kidneys
7.7%	Entrails ex liver and roes
5.0%	Liver
1.5%	Roes
0.7%	Undetermined waste - entrails
10.5%	Waste of head
26.8%	Total waste
71.1%	Total recovered
42.3%	Total loss v. recovered body
1.72%	Ratio fresh rd./ready for salting

100%

Average length of the fishes: 0.80

PORTUGAL - SUBAREA 1

Fyllas Bank and Store Hellefiske Bank

Means of Yields and Waste of Greenland Cod

80 fishes from 0.60 to 1.07 m. length

(June to July 1953)

No. of Spec.	Values			No. of Spec.	Percentages			No. of Spec.
	Max.	Mean	Min.		Max.	Mean	Min.	
80	9.938	5.238	2.435	100	100	100	80	
78	6.475	3.388	1.677	68.9	64.7	59.6	78	
80	5.775	3.019	1.472	60.4	57.6	48.1	80	
80	0.780	0.343	0.131	7.8	6.5	5.4	80	
72	0.096	0.040	0.012	0.9	0.7	0.5	72	
78	0.142	0.044	0.005	1.4	0.8	0.2	78	
80	3.384	1.728	0.691	34.0	33.0	28.4	80	
80	1.979	1.013	0.460	19.9	19.3	18.9	80	
79	0.915	0.434	0.194	9.2	8.3	8.0	79	
79	1.456	0.690	0.247	14.6	13.2	10.1	79	
80	0.996	0.447	0.142	10.0	8.5	5.8	80	
80	0.536	0.198	0.046	5.4	3.8	1.9	80	
43	0.190	0.065	0.015	1.9	1.2	0.6	43	
78	0.095	0.028	0.000	0.9	0.5	0.0	78	
79	1.184	0.575	0.219	11.9	10.9	9.0	79	
78	2.800	1.428	0.569	28.2	27.3	23.4	78	
80	7.144	3.680	1.765	75.7	70.3	59.7	80	
80	4.361	2.219	0.913	43.8	42.3	37.5	80	
	2.03	1.73	1.55					

Weight of fish as out of sea  
 Body after heading and gutting  
 Body ready for salting  
 1/3 anterior backb.+kidn.+airbl.  
 Recovered portion of airbladder  
 Undetermined waste - body  
 Total head with ventral entrails  
 Total head  
 Cheeks and tongues  
 All entrails ex airbl. and kidn.  
 Entrails ex liver and roes  
 Liver  
 Roes  
 Undetermined waste - entrails  
 Waste of head  
 Total waste  
 Total recovered  
 Total loss v. recovered body  
 Ratio fresh rd./ready for salting