

THIRD ANNUAL MEETING.Report on Conversion Factorsfor the Committee on Research and Statistics

At the Second Annual Meeting of the Commission, the Committee on Research and Statistics made the following 3rd and 4th Recommendations which were passed:

"That the Commission compile and publish its statistics in terms of metric tons round fresh weight (weight of entire fish as they come from the water)."

"That the Commission's Statistician be requested to review the situation regarding conversion factors in close cooperation with F.A.O., and I.C.E.S., and make a progress report to the Committee at the Third Annual Meeting."

The first of these two recommendations arose from the fact that records of landings were not always comparable owing to the fact that quantities landed were often given in various weight units and for fish dressed in various ways.

The conversion of data on landings to Metric tons round fresh weight involves that in recording statistics the condition of the fish when weighed for recording should be definitely stated as of course should also the weight unit used.

The Commission agreed that to assure international comparability and to make the analysis of statistics possible, Commission statistics should be published in terms of round fresh weight and in Metric tons.

This necessitates accurate conversion factors.

The second recommendation arose from the necessity of having accurate and reliable factors for converting the quantities landed and weighed at different stages of dressing back to round fresh weight and stresses the need for a review of the situation regarding conversion factors and for an appraisal of the progress made.

Before the Second Annual Meeting, the former Executive Secretary discussed the problem of conversion factors with government fisheries officials, with companies officials in the countries concerned and with officials of the Fisheries Division of F.A.O. A number of conversion factors were thus arrived at and used in Commission's statistics pending further investigation. These conversion factors, however, are to a large extent only estimates derived from long experience in handling fish. In cases where investigation had been made, the value of the conversion factors found is uncertain because methods used were often insufficiently stated. The present conversion factors are not completely reliable for the statistical purposes of the Commission. This problem is not limited to the Commission's statistics only but also extend to the I.C.E.S., and F.A.O.

The main factors influencing the change in weight from the time of capture as round fresh to the time the fish is landed are:

- 1) Seasons: which relate to the condition of the fish at the time of capture. That is fat fish, lean fish and fish of different stages of maturity. The possibility that fish cargoed during the cold months of the year would loose less weight than the fish cargoed during the summer months should be considered also.
- 2) Size of fish
- 3) Location of the fish in the hold: It means that the fish at the bottom of the vessel does not bear the same pressure as the fish on top of the cargo or at intermediate levels. That is, fish loose different weights depending on their location in the vessel.
- 4) Time factor: That is dependent on the type of vessel and its cargo capacity which have much bearing on the number of days the fish remains in the vessel from the first day of actual fishing to the time the fish is landed, which in turn influence the change in weight.

These factors ought to be taken into account fully when research work on conversion factors is done.

The following is a summary by country of the information the Commission had at the time statistics were published in terms of round fresh fish weight.

Canada

The table below combines five experiments made in July and August 1938, at Fox River, Quebec, by a student of the Fisheries School, Quebec. This information was furnished to the Commission by the Markets and Economics Service of the Department of Fisheries, Ottawa, Canada

Loss and Recovery for Cod

	<u>in lbs.</u>	<u>%</u>
1) Round cod (as it comes from the water)	700.0	100.00
2) Loss for		
livers	32.0	4.57
entrails	83.7	11.96
3) Recovery (dressed, head on)	584.3	83.47

According to the above table, the conversion factor to be applied to fish gutted, head on - as reported in Canadian statistics - to obtain round weight is 1.20. The same factor should be applied to haddock.

From the Fisheries Research Board (British Columbia), the table below gives the results of a special inquiry relative to halibut; these results can be safely applied to Atlantic halibut.

Loss and Recovery for Halibut (B.C.)

(in percentages)

1) Round weight as it comes from the water						
		100		100		100
2) Loss for						
heads	maximum	14	minimum	12	average	13
viscera	"	12	"	10	"	11
other	"	2	"	2	"	2
3) Recovery	minimum	72	maximum	76	average	74

It follows that based on average loss, the factor of conversion to be applied to fish beheaded and gutted, to obtain round weight, is 1.35; for fish head on and gutted - as reported in official Canadian statistics for the years 1931-1939 - the factor of conversion to obtain round weight should be 1.15. This information was relayed to the Commission by the Markets and Economics Service of the Department of Fisheries, Ottawa, Canada.

Investigation had also been carried out for Nova Scotia cod by a technician of the Fisheries Research Board. The Newfoundland Fisheries Research Station also made the same investigation.

There are continuous consultations between statisticians of the Fisheries Department, officials of the Fisheries Research Board and Services of the Department of Fisheries, the Inspection Service for example. From these consultations a large number of conversion factors establishing the relationship between round weights and products are surveyed continuously. A certain number of conversion factors thus arrived at are published annually in "Fisheries Statistics of Canada."

Denmark

Denmark had furnished to the Commission a conversion factor to be used temporarily pending further investigation.

France

For France, information was contained in estimates.

Iceland

Iceland carried in 1948 important experiments on conversion factors. The results of these experiments are embodied in the report: "Purpose and Methods in Fisheries Statistics, Document No. 15, Notes on Conversion Factors in Fisheries Statistical Work", published by the Fisheries Division of F.A.O. The following is a very short summary of some of the results of Icelandic experiments:

Percentage composition of the weight of round fresh cod:

Roe: 3.48%, liver: 5.92%, head: 16.93%, backbone: 6.44%, other offal: 10.94%, fillets: 56.29%, total 100.00% round fresh weight.

Product as percentage of round fresh weight

Process	Product weight as percentage of round fresh weight and corresponding conversion factor.	
Eviscerated, head on	83.3	1.20
Gutted and headed	66.7	1.50
Split and headed	60.0	1.66
Salted on board vessel	43.3	2.31
Salted fully-cured wet salted	40.0	2.50

Italy

For Italy, the conversion factor was evaluated in correlation with conversion factor for Spain.

Norway

Norway had indicated the conversion factor to be used in statistics.

Portugal

Conversion factor used for Portugal was derived from information for Spain.

Spain

Statistics from Spain contained conversion factors.

United Kingdom

Very little information was known relative to conversion factors to apply to United Kingdom statistics.

United States

Conversion factors were furnished with the statistics.

CONVERSION FACTORS USED TO CONVERT LANDINGS TO ROUND FRESH WEIGHTS
(Main Species)

Country	Cod			Haddock			Redfish	Halibut	Flounders	
	Fresh gutted	Fresh headed gutted backbone removed	Green salted	Fresh gutted	Fresh headed gutted backbone removed	Green salted			Fillet	Fresh gutted
Canada	1.20	-	-	1.14	1.35	-	-	1.15	1.20	-
Denmark	1.20	-	-	-	-	-	4.00	-	-	-
France	-	-	2.50	-	-	-	-	-	-	-
Italy	-	-	2.50	-	-	-	-	-	-	-
Norway	1.40	-	-	-	-	-	-	1.40	-	-
Portugal	-	-	2.50	-	-	-	-	-	-	-
Spain	-	2.00	2.50	-	2.00	2.50	-	-	-	2.00
U.S.A.	1.20	-	-	1.14	-	-	-	1.15	-	-

Note: For landings for the United Kingdom, 1.14 was used as indicated to the Commission for all species, while Iceland gave its statistics in round fresh terms.
The conversion factors contained in this table were used for the statistics published in the Second Annual Report.

At the Second Annual Meeting of the Commission, the consensus of opinion was that a joint effort by all countries to obtain improved conversion factors had to be made as soon as possible.

The document "Basic Statistical Requirements of the International Commission for the Northwest Atlantic Fisheries" dated October 1, 1952, requested from countries, statements on conversion factors when submitting their statistics.

The former Executive Secretary and the Statistician had, during their respective trips to Europe last fall, emphasized the urgent need for more information and investigation. All parties were of the opinion that a thorough investigation was necessary.

Since the Second Annual Meeting the interest in regard to the problem of conversion factors increased in a very noticeable way. New investigations were made and others planned for 1953. The following is a summary of information received since the Second Annual Meeting.

Canada

The basic data collected on investigations made on Nova Scotia cod are to be scrutinized closely. The Newfoundland Fisheries Research Station explored the situation since the Second Annual Meeting, but results have not yet reached Commission headquarters.

Denmark

The latest information received from Denmark is to the effect that:

On the basis of 467 individuals treated in Sukkertoppen (June 1952) and 43 treated in the Godthåb fjord (July 1952) the following conversion factors were found:

From gutted fish (with head) to round, fresh fish	x 1.25
" " "(without head) " " " "	x 1.5
" splitted " " " " "	x 1.62

6 heaps (å 500 kg) of fish salted the same date were investigated in the course of 6 days (one per day). After the 4th day the shrinkage ceased to increase. The conversion factor from splitted and salted fish to round, fresh fish was found to be x 2.6.

In Sukkertoppen 503809 kg round, fresh fish were made into 141098 kg fillets. Conversion factor from fillet to round, fresh fish x 3.6.

On the basis of the production of dried fish in 1950 and 1951 the conversion factor from dried, splitted fish to round, fresh fish was found to be x 7.3. (Paul Hansen)

France

Documentation prepared by the Scientific and Technical Office for Marine Fisheries.

It was found from experiments made before the war that:

1,200 kg of round fresh cod give 720 kg of headed, gutted and split fish, that is, a recovery of 60% before salting.

Weighing made in 1952 on board a French trawler fishing on the Newfoundland Banks gave the following results:

100 kg of round fresh cod gave 55 to 65 kg headed, gutted backbone removed fish and 37 to 38 kg of salted cod at the time of landing (about a month later).

According to weighing affectuated at St. Pierre et Miquelon:

100 kg of round fresh cod gave 60 kg of headed, gutted and backbone removed fish and 40 kg of green cod.

Further investigations will be carried on by France during the summer of 1953 on cod fished on the Grand Bank. (M. Desbrosses)

Iceland

Iceland sent to the Commission Secretariat figures from investigations carried out on the south west coast during March, 1952.

Salted Fish

- 1) 100 kg wet fish (as taken from the sea) = 2)
- 2) 79.66 kg gutted fish with head = 3)
- 3) 62.73 kg gutted fish without head = 4)
- 4) 56.29 kg split fish.

With the statistics for 1952, Iceland has also indicated a conversion factor used, although statistics were given on a round fresh weight basis.

Italy

In 1952 statistics Italy has indicated a conversion factor to be used for salted frozen cod.

Norway

Investigations were carried out and yielded the same conversion factor as indicated last year.

Portugal

Investigations will be carried out during 1953.

Spain

Experiments were made in 1952 aboard two trawlers owned by PYSBE Company:

Measurements for Conversion Factors
on Board Two PYSBE Trawlers.

Trawler VENDAVAL. Captain Mr. Fructuoso Medrano.

First Experiment

1. The 10th. May 1952 13 codfish (*Gadus morhua*) freshly captured were separated, whole, and weighed, giving a weight of 117.3 kilos (100%).
2. Immediately after they were headed, gutted, splitted and cleaned, that is, made ready for salting, as usual. Thus, they weighed 66.5 kilos (56.7%).
3. After being weighed, they were put into the hold, salted and covered with a sack cloth for identification; afterwards they were laid among the other fish. Unloaded in Pasajes the 14th. August and weighed (always on the same scales) they gave 37.0 kilos (31.5%). (Conversion factor 3.17)

Second Experiment

1. The 11th. May 1952 81 haddock (*Melanogrammus aeglefinus*) were separated and weighed whole, giving 102.6 kilos (100%).
2. Headed, gutted, etc., they gave 61.2 kilos (59.6%).
3. Unluckily, when unloading them in Pasajes the 14th. August, it was observed that 7 units were missing. The remaining 74 weighed 30.75 kilos. (Assuming that the mean weight of the 7 units was equal to the mean weight of the 74 ones, the results at unloading would be 32.8%). (Conversion factor 3.05)

Trawler ALISIO. Captain Mr. Antonio Andonegui.

First Experiment

1. The 7th. April 1952, 46 whole codfish weighed 100 kilos. (This Captain did not weigh the codfish after they were headed, gutted, etc.)
2. The 6th. November they were unloaded in Pasajes, weighing 32 kilos. (Conversion factor 3.12)

Second Experiment

1. The same day, 7th. April 1952, 53 haddock weighed 100 kilos.

2. The 6th. November they were unloaded, weighing 36 kilos. (Conversion factor 2.78)

Third Experiment

1. The 30th. May 1952, 44 codfish weighed 100 kilos.
2. The 8th. November 1952, in Pasajes, 32.5 kilos. (Conversion factor 3.08)

Fourth Experiment

1. The 30th. May 1952, 78 haddock, 100 kilos.
2. The 8th. November 1952, in Pasajes, 35 kilos. (Conversion factor 2.86)

Fifth Experiment

1. The 14th. August 1952, 20 codfish, 100 kilos.
2. The 11th. November 1952, in Pasajes, 40 kilos. (Conversion factor 2.50)

Sixth Experiment

1. The 14th. August 1952, 76 haddock, 100 kilos.
2. The 11th. November 1952, in Pasajes, 40.5 kilos. (Conversion factor 2.47)

United Kingdom

The following was received from the Ministry of Agriculture and Fisheries through I.C.E.S.:

Factors for Converting Landed
Weight of Fish to Round Fresh Weight

Headed: - plus 1/3 of landed weight.

Gutted Cod, Haddock and Hake: -

Large fish	-	plus 1/4 of landed weight
Medium fish	-	plus 1/6 " " "
Small and other fish	-	plus 1/8 " " "

United States

Investigations are planned for 1953.

In accordance with a resolution passed by I.C.E.S. at its meeting on the 7th October, 1952, the member countries have been asked for the conversion factors used when submitting statistics on the basis of round fresh fish weight. The Secretariat continues to be in contact with F.A.O. relative to conversion factors.

It can readily be seen from the table which appeared earlier in the text and from new information received that there is a need for research to be made by all countries according to an integrated plan. Although research is as yet incomplete that which has been done is nevertheless quite an important contribution towards improved conversion factors.

The Commission has to be provided with conversion factors derived from research in which the following factors have to be taken into account: seasons, size of fish, location of fish in the hold, and time factors.

For the continuation of investigations, it is suggested that the Committee on Research and Statistics consider a common plan for the investigations to be carried out, to the effect that the results of individual experiments may be as much as possible integrated according to the same framework. This would give the advantage of a mutual control from one series of experiments to another.

It is suggested for the attention of the Committee on Research and Statistics that research be the responsibility of well briefed persons who would be sent by their respective countries, on fishing vessels.

Samples should be weighed at intervals during the fishing trip and/or trips. A number of fish weighed at a certain date only is not representative of the change in weight of all the fish in a vessel when they are landed and does not account for factors mentioned earlier in this report (seasons, size of fish, location of fish in the hold and time factors) affecting the whole cargo of fish.

The fish should be weighed round fresh as they come from the water and again after having been prepared for storage in the hold. These individual fish would of course be tagged. At the same time, measurement of the entire length of these fish should be taken to obtain a conversion factor for large, medium and small fish. Clear statements of the condition of the fish as landed should be given together with units of measurement and weight used.

It is further suggested that the following form may be used for recording the results of weighing:

SUGGESTED FORM FOR RECORDING WEIGHTS

Country..... Name of vessel

Type of vessel Gross Tonnage

Net Tonnage Home Port

Sample No. (A or B etc.) Date of capture

..... Depth at time of capture

Gear used Species of fish

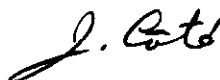
Condition of fish when prepared for the hold

Unit of measurement used Unit of weight used ..

..... Date of arrival in home port

	-1-	-2-	-3-	-4-	-5-
Sample Tag Number	Total length of fish round fresh	Weight of fish round fresh	Weight of fish when dressed	Weight of fish when landed	Date when weighed last
A 1					
A 2					
etc.					

JC/TD



J. Côté,
Commission Statistician.



Document No. 16
Appendix.

THIRD ANNUAL MEETING.

Communication on Conversion Factors Received from
Newfoundland Fisheries Research Station

A summary of the results of investigations on conversion factors which have been worked up to date is contained herein. Since most of the groundfish species are landed round we have concentrated in this work on cod and haddock which are landed in the gutted condition. We have attempted to find the weight of head on, eviscerated fish obtained from a certain weight of round fish. We have used only those fish over 40 cm., measured from the tip of the snout to the mid-fork of the caudal fin. The samples of fish used here were split, gutted, etc. by the Station biologists and technicians. The Grand Bank, Cape Breton, Flemish Cap and Fortune Bay samples were brought to the Station round and well iced by research boats. They were usually two to four days under ice and no fish in poor condition were weighed. The St. John's, Bonavista, S.W. coast and Labrador samples were examined on the spot only a few hours after being caught.

In our early work on fish weights we took round weights, and weights of eviscerated fish with the gills removed. This was later supplemented by taking gill weights also, so that a conversion may be obtained from the eviscerated state with gills removed to eviscerated with gills remaining.

For the total number of cod of which gill weights have been taken to date (1425) the gill weight was 4.75% of the eviscerated, gill-in weight (Table Ia). Using this as a basis for calculation, the eviscerated, gill-in weight was computed for other groups of cod totalling 2836 (Table Ib).

A small number of cod (4) were weighed while in the field at Domino at various stages from round to the split condition. The result of this work is shown in Table II.

A relatively small number of haddock have been used up to date; this work is continuing. The results to date are summarized in table III.

We have carried on no investigation on conversion from weights of salted fish to round weights but have followed the tables in the Canadian Fisheries Statistics, or where these were lacking for some product of a species we have used conversions supplied by the Statistical Branch, Department of Fisheries, St. John's.

Following is a list of conversions used by the Department of Fisheries, St. John's.

<u>Product weight (in pounds)</u>	<u>Multiplier to bring product weight to head on, evisc. weight</u>	<u>Multiplier to bring head on, evisc. wght. to round weight</u>
<u>Cod, Haddock, Pollock</u>		
- Fillets, fresh and frozen	2.65*	1.22
- Fillets, smoked	3.00	1.22
- Heavy salted, wet	2.20	1.22
- Light salted, dry	4.0	1.22
- Tinned	3.5	1.22
<u>Catfish (Wolffish)</u>		
- Fillets, frozen	3.17	1.22
<u>Halibut</u>		
- Dressed, fresh and frozen	1.05	1.05
- Fillets, frozen	1.39	1.05
	<u>Multiplier to bring product weight to round weight</u>	
<u>Redfish</u>		
- Fillets, frozen	4.0	* This conversion is apparently used in the case of fillets with the skin on.
<u>Flounders</u>		
- Fillets, frozen	4.65	

Signed,

A.M. Fleming.
W. Templeman.

CONVERSION FACTORS
NEWFOUNDLAND FISHERIES RESEARCH STATION

TABLE I (a)

Area	No. of Fish	Weight in Pounds			Percent Gills of Evisc., Gills in	Conversions			
		Round	Evisc., Gills out	Gills		Evisc., Gills in	Evisc. Gills out to Round	Evisc. Gills in to Round	
Grand Bank	1058	8420.41	6628.34	329.920	6958.26	4.74	1.27	1.21	
Flemish Cap	120	1060.3	861.7	46.548	908.248	5.12	1.23	1.17	
Off Cape Breton	78	353.30	296.14	14.379	310.519	4.63	1.19	1.14	
Fortune Bay	66	236.25	194.94	8.922	203.862	4.38	1.21	1.16	
St. John's	103	548.7	448.3	20.309	468.609	4.33	1.22	1.17	
TOTAL	1425	10618.95	8429.42	420.078	8849.498	4.75	1.26	1.20	
<u>TABLE I (b)</u>									
St. John's	1574	8813.17	7013.33		7363.08*		1.26	1.20	
Bonavista	219	976.2	758.4		796.22*		1.29	1.23	
S.W. Coast, Nfld.	408	2038.1	1667.1		1750.24*	4.75*	1.22	1.16	
Labrador	635	2086.3	1625.5		1706.56*		1.28	1.22	
TOTAL	2836	13913.77	11064.33		11616.10*		1.26	1.20	

*Eviscerated, gill in weight, calculated using 4.75 for percent that gill weight is of eviscerated, gill in weight.

TABLE II

Domino, Labrador - 40 Fish

State of Fish	Percent Waste	Percent of Round Weight
Round, fresh	0	100
Head on, eviscerated with gills	17.6	82.4
Head off, eviscerated	38.9	61.1
Fresh, split	45.9	54.1

RADDOCK

TABLE III

Area	No. of Fish	Weight in Pounds			Conversions	
		Round	Evisc., Gills out	Gills	Evisc., Gills out to Round	Evisc., Gills in to Round
Grand Bank	218	698.43	585.05	23.35	608.40	3.84
						1.19
						1.15

