A Preliminary Look at Conversion Factors for the Offshore Clam Fishery

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Abstract

The Arctic surfclam fishery lands the clams in a processed state, Individually Quick Frozen (IQF) foot portions, which may be raw or blanched, and frozen blocks of mantle tissue. Since the Total Allowable Catch (TAC) for this fishery is set in round weight, accurate factors are needed to convert landings from processed weight to round weight. Results of sample runs performed on the fishing vessels through the Observer Program are used to estimate conversion factors for raw and blanched IQF weights. This method uses the actual vessel processing line and thus provides the best estimate of these factors.

The preliminary factors, based on 13 runs of raw product and 20 of blanched are 5.38 and 6.67 respectivly. Further work is needed to increase sample size and look at vessel, area and temporal variances. Examination of recent landings show that the single conversion factor of 5.5 presently being used underestimates round weight by up to 18%.

Résumé

Les débarquements de mactre de Stimpson se font sous forme de produits transformés, notamment des siphons surgelés en I.Q.F., crus ou blanchis, et des blocs congelés de morceaux de manteau. Étant donné que le total autorisé des captures (TAC) est fixé en poids entier, des facteurs précis sont nécessaires pour convertir les débarquements de poids transformé en poids entier. On a utilisé les résultats d'essais réalisés à bord de bateaux de pêche par le truchement du Programme des observateurs pour estimer des facteurs de conversion pour des poids de produits surgelés en I.Q.F. crus et blanchis. Comme cette méthode fait appel à l'actuelle chaîne de transformation utilisée à bord, elle donne la meilleure estimation de ces facteurs.

Les facteurs préliminaires, basés sur 13 essais avec le produit cru et 20 essais avec le produit blanchi, s'élèvent respectivement à 5,38 et 6,67. D'autres travaux faisant appel à de plus grands échantillons sont requis, tout comme des travaux pour établir la variance entre les bateaux et les zones, ainsi que dans le temps. L'examen de débarquements récents révèle que l'unique facteur de conversion présentement utilisé, soit 5,5, sous-estime le poids entier par jusqu'à 18 %.

Introduction

The Total Allowable Catch (TAC) for the offshore clam fishery is set in round weight but the product is landed in a processed state. This means that accurate conversion factors for calculating round weight from processed weight are needed. The products landed are Individually Quick Frozen (IQF) foot portions, either raw or blanched, and frozen blocks of mantle tissue, including the adductor muscles and siphons.

When the fishery first started on Banquereau Bank, the Statistics Branch for the former Scotia-Fundy Region used a factor of 6.0 applied to the combined landed weight of processed tongue (foot) and mantle meat. This was changed for 1990 to separate conversion factors of 5.37 and 6.51 for Raw and Blanched Individually Quick Frozen (IQF) foot portions. The mantle, which is a secondary product, was not used in the conversion to round weight. When the fishery started on the Grand Bank a factor of 5.5 was used by Newfoundland Region, and applied to both raw and blanched products. In the latter part of 1993, in order to be consistent between Regions, Scotia-Fundy Region began using the 5.5 factor applied to both raw and blanched products. This factor was to be used for one year, and a program designed to resolve this question was to start in Newfoundland, where most of the fishery was then taking place. This program was to run in cooperation with Inspection Branch and the Observer program, but did not take place due to funding constraints. The factor of 5.5 has been used from 1993 to 1995.

A study had been initiated in Scotia-Fundy in 1989 to estimate conversion factors. The study, carried out through the Observer Program, was designed to estimate real production conditions on board the vessels. Preliminary results from the study had formed the basis for the conversion factors used by Scotia Fundy Region in 1990. In 1992, as all fishing activity was taking place in Newfoundland Region and the larger study planned, the observer coverage from Scotia Fundy was dropped, and sampling for conversion factors ended.

With annual landings on Grand Bank now approaching its TAC, the issue of conversion factors has become more important, and it was decided to use the data that had been gathered to estimate conversion factors for this fishery.

Methods

Since the main product of interest is the foot portion of the clam, it was felt that this would be the best foundation on which to base the conversion factor. Frozen mantle tissue is also landed, but this is a low value by-product, and so occasional losses of this product, due to such factors as processing problems, are acceptable to industry. The foot portion is landed in two main product forms, Individually Quick Frozen (IQF) raw and IQF blanched. The blanching step results in a reduction in weight due to water loss and so separate conversion factors for each product type are needed.

Initially, after consultation with the plant manager, it was felt that the best method would be for the observer to prepare a sample by counting and weighing a few bushels of clams. When the observer was ready, a break in the production run would be created by holding back the clams being fed into the production line. Once a sufficient gap was produced to separate the sample from regular production, the sample would be fed into the line. Regular production would not start until another gap was created behind the sample. After a few attempts it became obvious that the retention time in the machinery was such that it was impossible to create enough of a gap to separate the sample without completely disrupting production for a considerable period of time.

The second approach was to use the breaks created when the IQF tunnels were defrosted. This would take 30 to 40 minutes, but as the break was also used to conduct repairs it was often

longer. The production line was usually cleaned at this time, so it was easy for the observer to run a sample through the line before regular production resumed. The weight added by glazing could not be included during shut-down, as the IQF tunnels were defrosting.

The observer would collect a sample and record the total weight and number of clams. The sample was then fed into the production line when it was re-started. The number and weight of processed feet were taken at the final stage before they would normally go into the IQF tunnels. The processed mantle portion was checked for feet and the number and weight of these recorded separately. Losses other than those to mantle production were attributed to clams still in the processing line, and the initial weight was corrected proportionally to the numbers produced. The conversion factor for each product type was then based on the ratio of foot weight produced plus estimated glazing, to corrected initial weight. A copy of the sampling form used is shown in Appendix A.

Results

A run of 11 samples done in April 1991 gave an average value of 10.5% of the unglazed weight added (Table 1). This difference would result in an overestimate of the weight, but as there was only one sample and the production line target is 7%, we have used that value in the calculation of the conversion factors.

Problems were encountered when the observers were deployed at short notice without the opportunity to adequately brief them on sampling procedures. They were supplied with sampling forms and instructions but this often did not produce the desired data.

Complete data were obtained for 13 runs of raw product and 20 of blanched. The results are shown in Tables 2 and 3 respectively. The derived factors to convert from landed product weight back to round weight are 5.38 for raw, and 6.67 for blanched product.

Discussion

The method used here to estimate the conversion factors attributes all losses to clams being retained in the processing line, and corrects for them in the estimate. These losses average 5% by number, but the analysis assumes that during regular production these clams would be processed. It is known, however, that there are real losses from the production line. The largest of these losses is thought to be due to feet being discarded with the shell, due to incomplete separation. What data we have shows that this loss is small (0.6 % based on 6 samples), but it has been noted that it is higher when producing a raw product. Other losses such as clams falling from a production line, and discards due to 'spoiled' product, are reported to be minimal. Although they are small, these losses are excluded from the calculations and so result in an underestimate of the conversion factor. It was also noted that it takes more time for the mantle to complete the process than the foot portion, and that mantle tissue from the sample was probably still in the line when regular processing started. Additional feet in the mantle portion would again result in an underestimate of the conversion factor, as they were excluded from the calculations. The vessel plant managers were very surprised to see foot portion numbers as high as eight percent by weight in the mantle product. They recognize the value of reducing these numbers, which, if done, would have the effect of reducing the true conversion factors.

The use of a single conversion factor for both raw and blanched product types would only work if the mix of products was consistent. This is not the case in this fishery, as the product mix shifts with market demands and varies among companies. The following Table shows the difference between using the estimated conversion factors for the two product types against a single factor of 5.5. This Table is based on landings from Banquereau Bank, and thus the results may be different for other areas:

Year	Catch Weight (kg) 2 factor	Single 5.5 factor	% Difference
90	2,644,668	2,243,648	17.9
91	549,477	464,228	18.4
92	0	0	-
93	37,042	31,295	18.4
94	5,328,779	4,534,591	17.7
95	11,599,369	9,815,647	18.2

The use of the suggested separate conversion factors results in an 18% higher estimate of round weight than that obtained when using the single factor of 5.5. The difference will vary with the mix of product types being landed. With the current single factor of 5.5, an enterprise landing mostly blanched product could overrun their real Enterprise Allocation (EA) without appearing to do so in the official landing statistics. Since this fishery is managed by a quota based on round weight, managers should be using the most accurate conversion system obtainable.

Summary

The data used in this study provides the best estimate to date on conversion factors under actual processing conditions on the vessels. Further work to increase the sample size, compare vessels and calculate other losses are needed. The work done so far indicates conversion factors to estimate round weight from the IQF foot portions produced are 6.67 for blanched and 5.38 for raw product.

Table 1. Glazing test done in April, 1991 on the Atlantic Pursuit.

Tunnel Temp	Initial weight	Glazed weight	Weight of glaze	% of initial	% of final
-29.0	4.04	4.48	0.44	10.89	9.82
-23.8	4.12	4.52	0.40	9.71	8.85
-24.1	4.76	5.22	0.46	9.66	8.81
-25.2	3.72	4.12	0.40	10.75	9.71
-27.0	4.34	4.86	0.52	11.98	10.70
-28.3	3.98	4.42	0.44	11.06	9.95
-31.2	3.78	4.26	0.48	12.70	11.27
-26.6	5.40	5.88	0.48	8.89	8.16
-24.5	4.26	4.63	0.37	8.69	7.99
-30.7	4.82	5.36	0.54	11.20	10.07
-24.8	4.58	5.04	0.46	10.04	9.13
			Mean	10.51	9.50
			Std. Dev.	1.24	1.02

Table 2. Calculation of Conversion Factor (CF) for raw product.

Date	Area	Sample		Tounges Produced		Tounges in Mantle		Total	Loss	Adj Wgt	CF
		Wgt	Number	Wgt	Number	Number	Wgt		H	J	J/(C*1.07)
		A	B	C	D	E		D+E	B-(D+E)	A-H*A/B	
31/07	3N	56	358	9.46	350	5	0.10	355	3	55.53	5.49
01/08	3N	57	375	9.48	345	12	0.18	357	18	54.26	5.35
02/08	3N	57	365	9.20	335	21	0.40	356	9	55.59	5.65
03/08	3N	61	400	9.32	350	34	0.56	384	16	58.56	5.87
04/08	3N	56	360	9.36	344	24	0.44	368	-8	57.24	5.72
04/08	3N	60	383	10.04	355	12	0.16	367	16	57.49	5.35
05/08	3N	56	363	8.36	290	5	0.14	295	68	45.51	5.09
07/08	3N	58	379	9.70	341	11	0.16	352	27	53.87	5.19
09/08	3N	57	371	9.76	331	8	0.16	339	32	52.08	4.99
09/08	3N	58	356	9.21	334	14	0.25	348	8	56.70	5.75
10/08	3N	58	380	10.20	362	8	0.10	370	10	56.47	5.17
11/08	3N	56	364	10.11	339	11	0.18	350	14	53.85	4.98
11/08	3N	55	339	8.84	305	8	0.20	313	26	50.78	5.37
Mean		57.31	368.69	9.46	337.00	13.31	0.23	350.31	18.38	54.46	5.38
Std Dev		1.70	15.18	0.52	19.79	8.36	0.14	23.81	18.28	3.48	0.30

Table 3. Calculation of Conversion Factor (CF) for blanced product.

Date	Area	Sample		Tounges Produced		Tounges in Mantle		Total	Loss	Adj Wgt	CF
		Wgt	Number	Wgt	Number	Number	Wgt		H	J	J/(C*1.07)
		A	B	C	D	E		D+E	B-(D+E)	A-H*A/B	
01/06	3N	45	300	5.76	271	19	0.24	290	10	43.50	7.06
02/06	3N	56	368	7.80	349	9	0.10	358	10	54.48	6.53
08/06	3N	82	585	11.88	547	18	0.22	565	20	79.20	6.23
09/06	3N	86	598	12.90	566	11	0.14	577	21	82.98	6.01
10/06	3N	58	400	7.98	379	7	0.08	386	14	55.97	6.55
11/06	3N	90	630	12.52	578	23	0.32	601	29	85.86	6.41
12/06	3N	90	630	12.44	599	27	0.40	626	4	89.43	6.72
12/06	3N	98	670	13.62	628	23	0.26	651	19	95.22	6.53
04/02	4Vs	53.50	305	6.50	264	31	0.50	295	10	51.75	7.44
06/02	4Vs	53.00	299	6.50	266	33	0.25	299	0	53.00	7.62
08/02	4Vs	59.50	410	8.25	379	17	0.25	396	14	57.47	6.51
10/02	4Vs	56.00	399	7.50	318	37	0.35	355	44	49.82	6.21
18/04	3N	15.00	101	1.90	86	3	0.06	89	12	13.22	6.50
19/04	3N	55.50	350	7.14	319	15	0.28	334	16	52.96	6.93
24/04	3N	68.75	450	9.58	408	18	0.38	426	24	65.08	6.35
25/04	3N	70.75	450	9.70	412	18	0.38	430	20	67.61	6.51
27/04	3N	69.50	450	9.60	405	16	0.34	421	29	65.02	6.33
28/07	3N	57.00	360	6.90	305	28	0.48	333	27	52.73	7.14
28/07	3N	57.00	357	7.18	308	32	0.60	340	17	54.29	7.07
29/07	3N	57.00	355	7.75	334	11	0.21	345	10	55.39	6.68
Mean		63.88	423.35	8.67	386.05	19.80	0.29	405.85	17.50	61.25	6.67
Std.Dev.		18.93	140.76	2.90	137.47	9.34	0.14	138.39	9.99	18.69	0.42

Appendix A. Sampling form used to estimate conversion factors conversion factors

Vessel	Set number	Date	Observer

Sample weight: _____

Number of clams: _____

Product Raw: ___ or Blanched: _____

Tongue production:

Weight of tongues _____

Number of tongues _____

Mantle production:

Weight of mantle _____

Number of tongues in mantle _____

Weight of tongues in mantle _____

Shell discharge:

Number of tongues in shell discharge _____

Weight of tongues in shell discharge _____

Comments (Use attached sheets as necessary):

Amount of sample still in line when regular processing resumed.

_____

Time sample was in blanch tank in comparison to regular processing.

_____

Unrecorded losses from sample.

_____

_____

_____

_____

Differences between sample run and regular production that may affect the conversion factor.

_____

_____

_____

_____

_____