MINISTERIE VAN LANDBOUW
BESTUUR VOOR LANDBOUWKUNDIG ONDERZOEK
RIJKSCENTRUM VOOR LANDBOUWKUNDIG ONDERZOEK - GENT

RIJKSSTATION VOOR ZEEVISSERIJ - OOSTENDE
Directeur : P. HOVART

DETERMINATION OF NET CONTENTS OF GLAZED INDIVIDUALLY FROZEN FISHERY PRODUCTS (*)

W. VYNCKE

(*) Paper presented at the 2nd meeting of the Working Group on Aanalytical Methods for Fishery Products of the West European Fish Technologists Association (Copenhagen, March 1980).

Mededelingen van het Rijksstation voor Zeevisserij (CLO Gent)

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1. Introduction.

According to the recommendations made at the 1979 meeting of the Working Group on analytical methods for fishery products of the West European Fish Technologists Association a series of experiments was carried out with a variety of individually frozen fishery products in order to evaluate the procedure proposed by Aitken (Torry Research Station, Aberdeen) for net contents determination of products covered with glaze (see Appendix 1). The main differences from published methods which are equivalent to or derived from the method of the Association of Official Analytical Chemists (Appendix 2), are that a fixed deglazing period of 30 seconds and water temperature limits of 10 to 20° C are proposed.

2. Experimental.

- Fishery products : small dressed plaice (200-250 g), small whole gutted whiting (250-350 g), cod fillets (125-175 g), scallops (15-30 g) and cooked unpeeled deep sea shrimps (Pandalus borealis, 5-10 g) were used.

- Procedure : the products were frozen, divided in batches of 400-750 g, weighed and glazed by dipping in water at 1° C. The average percentage of glaze (calculated on the original fish weight) was kept between 10 and 20 %. They were stored for 24 hrs at -30° C and weighed again. The samples were then put into a wire mesh basket and immersed in circulating water maintained at 15° C for 20, 30, 35 or 40 sec as indicated. The basket was shaken rhythmically (about once per second) to ensure all surfaces to be uniformly exposed. The samples were then quickly dried with paper towels and weighed.

Twenty samples were taken for each experiment.

Emphasis was laid on the determination of the net contents (recoveries) of fish, as this is of practical importance. Indeed, consumers (and inspection services) are mainly interested in the net weight of the products and not of the glaze. However, data on recovery of glaze were also included as they can give useful information on the relative efficiency of the different procedures. It should be stressed however that the statistical interpretation is different, the amount of glaze being much lower in absolute value than the fish weight. The same deviation (in g) from the expected weight gives a larger relative error when considering the glaze recovery.

3. Results and discussion.

3.1. Fillets.

With cod fillets two deglazing times (20 and 30 s) were tested. (table 1).

Table 1 - Recovery of fish and glaze with cod fillets.

Time(s)	Weight(g)	Glaze(%)	Fish Recovery(%)	s	Glaze recovery(%)	s
20	475-560	19,9 (10,7-26,8)	102,0 (97,8-108,2)	2,08	89,6 (67,6-118,9)	12,38
30	486-570	18,5 (12,8-23,4)	99,7 (98,6-101,9)	0,75	102,0 (92-107,9)	3,90

There was a significant difference (F-test) between the standard deviations of the fish recoveries, indicating the 30 s procedure to be more reproducible. Moreover, 20 s gave only about 90 % glaze recovery. The recovery of 99,7 % was not significantly different from 100 % (t-test). This was not the case for the 102,0 % of the 20 s test.

3.2. Plaice :

The same procedure was followed for plaice (table 2).

Table 2 - Recovery of fish and glaze with plaice.

Time(s)	Weight(g)	Glaze(%)	Fish recovery(%)	s	Glaze recovery(%)	s
20	416-574	14,7 (7,4-22,4)	101,5 (100,2-103,8)	1,04	89,7 (85,0-97,6)	5,58
30	412-576	18,2 (14,0-22,0)	100,1 (99,2-101,2)	0,55	99,5 (97,1-103,9)	2,63

The same conclusions can be drawn as for fillets : the dipping time should be at least 30 s.

3.3. Whiting.

In a first series of experiments, 30, 35 and 40 s were tested (table 3). Taking into account the results of the two previous tests, 20 s was not applied any more.

Table 3 - Recovery of fish and glaze with whiting.

Time(s)	Weight(g)	Glaze(%)	Fish recovery(%)	s	Glaze recovery(%)	s
30	492-752	13,7 (9,8-16,0)	100,5 (99,4-102,1)	0,69	95,5 (86,5-103,9)	4,78
35	487-751	10,6 (8,4-13,4)	99,8 (98,8-100,4)	0,49	102,4 (96,5-112,6)	4,62
40	446-713	10,1 (7,4-11,6)	99,9 (99,4-101,3)	0,28	99,8 (83,5-105,3)	6,85

Differences between the three series were small, indicating the time factor not to be critical for small round fish. All fish recoveries were not significantly different from 100 %.

In a second series, the influence of a lower amount of glaze and of no glaze at all was tested with a 30 s dipping time (table 4).

Table 4 - Influence of low amounts and 0 % glaze.

Glaze(%)	Fish recovery(%)	s	Glaze recovery(%)	s
6,2 (4,6-8,2)	100,2 (99,7-101,2)	0,43	96,7 (82,7-105,5)	6,75
0	99,9 (99,4-100,5)	0,35	-	-

The amount of glaze appeared to be of no influence on the determination of the net contents (for glaze percentages lower than ca 25 %).

3.4. Scallops.

Dipping times of 30, 35 and 45 s were used with scallops (table 5).

Table 5 - Recovery of fish and glaze with scallops.

Time(s)	Weight(g)	Glaze(%)	Fish recovery(%)	s	Glaze recovery(%)	s
30	420-522	15,6 (12,9-17,8)	102,0 (100,5-103,4)	0,73	87,1 (80,9-96,9)	4,83
35	438-525	16,6 (14,1-19,3)	100,5 (97,6-102,0)	1,15	97,5 (89,4-105,9)	5,05
40	423-525	12,5 (7,4-15,1)	100,0 (98,0-101,0)	0,64	98,4 (92,9-102,1)	2,35

The deglazing time of 30 s appeared to be insufficient. The fish recoveries differed significantly from 100 % (t-test) ; 35 or 40 s were adequate and were not significantly different from 100 %.

3.5. Shrimps.

Deep-sea shrimps were deglazed for 30 and 35 s respectively (table 6).

Table 6 - Recovery of fish glaze and with shrimps.

Time(s)	Weight(g)	Glaze(%)	Fish recovery(%)	s	Glaze recovery(%)	s
30	512-599	17,3 (14,9-20,7)	101,0 (95,6-104,8)	2,89	95,8 (74,7-127,0)	16,4
35	495-604	15,7 (11,6-21,1)	99,7 (96,3-104,1)	2,53	102,3 (80,5-124,5)	13,4

There was no significant difference between the two series of tests. Fish recoveries were not significantly different from 100 %. The rather high standard deviation should be noted, which can be explained by the irregular shape of the product.

3.6. Influence of higher percentages of glaze.

Additional tests were carried out with scallops and shrimps covered with about 35 % glaze. Fish recoveries were 105 % (s = 1,13 %) for scallops and 110 % (s = 2,20 %) for shrimps, indicating the 30 s deglazing time to be too short.

3.7. Influence of product temperature.

All tests were carried out with fishery products maintained at -30° C. Higher temperatures could influence the results as partial thawing and drip loss could occur. However, supplementary experiments conducted at - 12° C with whiting showed the recoveries to be 101, 0 (s = 0,64) and 100,6 % (s = 0,28) for 30 and 40 dipping times respectively, indicating the temperature not to be of any influence.

4. Conclusions.

- The proposed method using a 30 s deglazing time gives satisfactory results with a variety of glazed single frozen fishery products. However, as the time factor did not appear to be critical between 30 and 40 s and as for one product (scallop) the recovery of glaze was better with 35 s, this time could be suggested instead of the original 30 s. It is however possible that the deglazing procedure itself (especially the shaking rate) has some influence. This should be investigated further.

- The previous conclusion is valid for single frozen products covered with a maximum of about 25 % glaze. The majority of commercial products complies with this limitation.

- As to be expected, the reproducibility of the results is decreased for small-sized products of irregular shape such as shrimps. Even in that case however it is possible to determine the net contents with sufficient precision. For example, if 10 samples from a batch of glazed shrimps are measured, the true mean net contents of the product will lie, with 95 % certainty between 98,3 and 101,7 % of the declared weight.

Appendix 1

PROVISIONAL RECOMMENDED METHOD (Aitken, Torry Research Station, Aberdeen)

a. Remove package from low temperature storage and proceed as quickly as possible. Remove ice from outside of package and weigh (W_1). Remove from package and transfer to wire mesh basket, of mesh size small enough to retain product but large enough to allow free flow of water. The basket should not be more than one third filled by the product. If visible dehydration or significant "snow" formation is present, the measurement should be abandoned.

b. Spray product with water at 10-20° C or immerse in flowing or circulating water at 10-20° C for 30 seconds, shaking basket to ensure all surfaces are uniformly exposed.

c. Remove basket from spray or bath, shake quickly and empty contents on to paper towel or other suitable absorbent material. Quickly dry all surfaces.

d. Transfer to preweighed covered container and weigh. Obtain product weight by difference (W_2).

e. Dry and weigh original package (W_3).

f. Net contents = W_2

$$\text{or} = \frac{W_2}{W_1 - W_3} \times 100, \text{ as percentage of original weight}$$

Apparent glaze = $W_1 - W_2 - W_3$

$$\text{or} = \frac{W_1 - W_2 - W_3}{W_1 - W_3} \times 100, \text{ as percentage of original weight}$$

Appendix 2

METHODS OF MEASURING GLAZE

Method of the AOAC (1)

Determination of net contents of products covered by glaze

As soon as a package is removed from low temperature storage open immediately and place the contents under a gentle spray of cold water. Agitate carefully so that the product is not broken. Spray until all ice glaze that can be seen or felt is removed. Transfer the product to a circular No. 8 sieve 20 cm (8 inches) in diameter for samples weighing less than 900 g (2 pounds) and 30 cm (12 inches) for those more than 900 g (2 pounds). Without shifting the product incline the sieve at an angle of approximately 17-20° to facilitate drainage, and drain exactly 2 minutes (stop watch). Immediately transfer the product to a tared pan and weigh (Methods of Analysis of AOAC 18.001).

Modification by the Codex Alimentarius (2)

Replace the last three sentences by a sentence reading : "Remove adhering water by the use of a paper towel and weigh the product in a tared pan".

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(1) Official Methods of Analysis of the Association of Official Analytical Chemists, 12th Ed., A.O.A.C., Washington D.C., 1975.

(2) Report of the 7th Session of Codex Committee on Fish and Fish Products, 1972.