

# THE SMOKING OF HADDOCKS FOR CANADIAN MARKETS

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**THE SMOKING OF "HADDOCKS" FOR CANADIAN MARKETS—AN INVESTIGATION CONDUCTED AT THE MARINE BIOLOGICAL STATION AT ST. ANDREW'S, N.B.**

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## 1. INTRODUCTION.

The production of finnan haddie is an industry of some importance on the coasts of the Maritime Provinces. This importance, however, is not national, in degree, as it is on the Scottish coast. There is not the demand on the market for finnan haddie "Made in Canada" that there might quite well be, if it were made to become the equivalent of the Scotch article of diet in flavour and texture. The processes used in both countries are somewhat similar, it is true, being based on the original method used in the little Scottish town of Findon on the north coast. Variations were introduced by the different fish-curers, which were considered expedient or profitable to them, but at times detrimental to the culinary value of the fish, upon which followed a lowering of both the market value and the demand on the market for this excellent foodstuff. The point of first importance in the Scottish industry was the improvement of the flavour of fresh fish, and, of second importance, was the preservation of the fish. These are in the reverse order in the industry as developed in this country. Many of the markets are far distant, and flavour has been sacrificed to preservation, but often inferior, second-rate or slightly tainted fish are used in producing the finnan haddie, so that the quality of the finished product is poor or, at any rate, not to be relied upon. The best of the catch is put up for exportation on ice, fresh, and until these first quality ones are used to make finnan haddie, the Canadian market will not increase its demand for them, the consumer preferring to purchase the fresh fish off ice rather than the smoked one of doubtful origin and quality. It is surely the part of wisdom to create the demand on the market by first producing a more excellent haddie, and then to encourage fish curers to reach and keep up that standard of excellence.

## 2. SCOTTISH METHOD.

The method of producing finnan haddies, as practised in Aberdeenshire, the most important Scottish centre of the industry, includes the processes of splitting, salting, and smoking.

"The fresh haddock is first treated by removing the head, splitting, eviscerating, and then giving an extra cut behind the backbone from the right-hand side in order to expose to view and facilitate the curing of the thick muscles of the back. This supplementary cut does not extend to the tail. The fish is then salted for half an hour in strong brine, and, after draining, is ready for smoking".<sup>1</sup> Peat and sawdust are used in producing the smoke; the fish, which are placed on sticks in tiers, and, on the other, receive constant attention during their short stay of five or six hours in the dense smoke which the peat produces.

Smaller fish are cured separately, the time of both pickling and smoking being diminished so that the flesh does not become tough—on the contrary, these lightly cured small fish are a great delicacy.

The Canadian method of curing differs in some important essentials from the Scotch, besides varying in minor details.

<sup>1</sup> Excerpt from H. M. Smith's "Note on Scotch Methods, etc." U.S. Commission on Fish and Fisheries, 1901.

## 3. CANADIAN METHOD.

(1) No vertebral cut is made after splitting. Bacteriological tests of the flesh under the backbone of finnan haddie only forty-eight hours old gave positive cultures of trimethylamine-producing bacteria in many cases.<sup>2</sup>

(2) The smoke is produced by burning hardwood, preferably beech or birch. The smoke is, consequently, not so dense and the process has to be continued for a much longer period of time, fifteen to sixteen hours, when the fish is a rich golden brown colour, the edges almost brittle, and the flesh in the middle thick portions still moist and scarcely flavoured by the smoke.

(3) At times the fish are allowed to stand one to three days before curing, ostensibly to allow the blood to drain away, but this can be accomplished in one hour on ice, so that one fails to see the point of this lack of expeditionness.

## 4. CONDITIONS ESSENTIAL FOR SUPERIOR PRODUCT.

The endeavour was made to determine, if possible, what were the optimum conditions for the production of finnan haddie *par excellence* on the coasts of the Canadian Maritime provinces. That these conditions would differ from the Scotch has been pointed out—for example, in the absence of peat as fuel, and the demands of distant markets; and under these latter circumstances a certain sacrifice of flavour to preserving property must be made, still, it is quite within the limits of possibility to so standardize the industry that these variable conditions would be altered to suit the requirements of the market for which the fish were destined.

These variable conditions are:—

- (1) Time of the fish in brine.
- (2) Quality of brine.
- (3) Quality of smoke.
- (4) Time of smoking.
- (5) Method of splitting.

## 5. SCIENTIFIC TESTS OF CURING METHODS.

Most of these conditions were varied in the tests described below. The record of the flavour of the different haddies when cooked was made from the opinions obtained from several individuals to whom were given samples of the various products.

*Experiment 1.*—The first haul of haddock were cured according to the method used by certain of the New Brunswick curers—except that here, as in each test, perfectly fresh fish and of approximately the same size were used. That the fish should be of the same size and weight is important, as a comparison otherwise would be obviously inaccurate.

*Experiment 2.*—The fish in this lot were smoked for varying periods of time, the salting being constant.

*Experiment 3.*—In this the conditions were reversed. Smoking time constant and time in the brine varied.

*Experiment 4.*—Small fish were used and both conditions were varied to produce a delicately flavoured lightly-cured fish.

*Experiment 5.*—In this the preservative value of the salt content of the fish is shown and its limit, as far as palatability is concerned.

*Experiment 6.*—In this the method is applied to the hake.

*Experiment 7.*—Proves the advisability of the dorsal incision.

<sup>2</sup> Bacteriological examinations were made by Dr. F. C. Harrison, MacDonald College, and his report appears in the present volume of Biological Contributions.

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Experiment.	Date.	Preparation.	Salting.	Smoking.	Remarks.
No. 1.	July 20.	Split abdominally—eviscerated—washed clean.	25 minutes' brine of sufficient concentration to float a fish. Then allowed to drain.	18 hours over slow hardwood fire.	Colour—dark brown—edges very dry—almost brittle.
No. 2.	August 2.	Split abdominally—eviscerated.	(a) 30 minutes as above.	12 hours over old wood to which was added creosote.	Colour—light brown. Flesh—soft. Flavour—delicate.
			(f) 30 minutes as above.	15 hours.	Colour—darker. Flesh—firm. Flavour—excellent. Preserved 4 days. Excellent flavour. Flesh not tough nor too salty.
No. 3.	August 4, one dozen large fish $\frac{3}{4}$ lb.	Split abdominally. Eviscerated. Kept on ice overnight. Well washed.	(a) 30 minutes.	18 hours.	Flesh too salty but not toughened. Salt could be removed by previous soaking.
			(b) 2 hours.	18 hours.	Texture too tough. Preserved 17 days at 10° C.
			(c) 4 hours.	18 hours.	
No. 4.	August 10, one dozen small fish $\frac{1}{4}$ lb.	Opened dorsally given the extra cut along the vertebrae.	(a) 15 minutes.	(a) 1. 5 hours.	1. Insufficiently flavoured.
				2. 10 hours.	2. Still moist—flavour delicious.
				3. 15 hours.	3. Flesh crumbly—did not hold together in cooking. Preserved nine days.
			(b) 30 minutes.	(b) 10 hours.	4. Flavour not so good as when salted 15 minutes but flesh firmer and of better keeping quality.
1.	August 10.	As above.	(c) 1 hour.	(c) 1. 10 hours.	Flavour—somewhat coarsened texture—otherwise good. Excessive salt removed by three washings previous to cooking—20 minutes.
				2. 15 hours.	Flavour—about the same as above. Preserved—8 days to 20. Texture coarsened somewhat.
No.	August 18, ten small hake.	Split abdominally.	(a) Salted $\frac{1}{2}$ hour.	About 10 hours until brown colour. Very windy day.	Flavour—inferior to haddock but reasonably good.
			(b) Salted 1 hour.	" " "	Texture—inferior to haddock, but reasonably good. Too salty—much too long for these fish which are thinner than the haddock.

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*Details of Experiment 7.*—Estimations of the NaCl content of the fish muscle and inner portions to determine approximately how much the flesh under the backbone absorbed within a given time. The portions were extracted with 10 vols. water for three hours with frequent stirring—10 c.c. of the boiled filtered extract were used in the estimations.

Exp. No.	Sample.	c.c. N/11 silver nitrate used.	Equivalent in grams NaCl	Per cent in moist muscle.
83	Salted $\frac{1}{2}$ hour, flesh under bone..	1.965 c.c.	0.01965	1.965
84	Salted 2 hours, flesh under bone.	2.5 c.c.	0.025	2.7
87	Salted 4 hours, flesh under bone.	8.26 c.c.	0.0826	8.26
86	Salted 4 hours, flesh from surface	11.05 c.c.	0.1105	11.05

Obviously, this table shows that it takes some four hours for the flesh under the bone to approximate that of the external portion of the flesh in salinity, and affords a strong argument for the exposure of the back muscle to the saline by making the vertebral cut.

#### 6. CONCLUSIONS.

(1) The splitting of the fish in the usual way, but also making an additional cut along the vertebral column is the most effective method of preparation.

(2) The fish are freed from blood by allowing to remain on ice 1 to 2 hours. They should then be washed freely with fresh water.

(3) Small fish should not be salted more than 15 minutes. Larger fish up to four pounds should not be salted more than one hour if the texture of the fish is to be preserved, and half an hour is the optimum length of time in saline for the flavour of the fish.

(4) Ten hours over a beechwood sawdust, or old-wood smoke produced a deliciously flavoured fish. Fifteen to eighteen hours browns and dries the fish and aids in its preservation by more thorough drying.

These conditions should be altered to suit the market, the more lightly cured fish being utilized in the home markets and the heavier-salted for the distant ones. The chief condition to be emphasized, however, is the utilization, for the production of finnan haddie, of first-class perfectly fresh haddock, and the keeping of it cold after it is prepared.