

TABLE III.—Record of distribution of shad fry made from April 30 to June 11, 1885, by Battery Station, Maryland.

Date.		Number of fish.		State.	Place.	Stream.
		Originally taken.	* Actually planted.			
1885.						
Thursday..	April 30	85,000	85,000	Maryland....	Battery Station ¹ .	Susquehanna River.
Wednesday	May 6	300,000	300,000	Pennsylvania.	Harrisburg ²	Do.
Sunday....	May 10	473,000	473,000	Maryland....	Battery Station ³ .	Do.
Tuesday...	May 12	260,000	260,000 ⁶	Alabama.....	Montgomery.....	Alabama River.
Thursday..	May 14	506,000	506,000	Maryland....	Battery Station ³ .	Susquehanna River.
Sunday....	May 17	245,000	245,000	do.....	do ⁴	Do.
Monday....	May 18	56,000	56,000	do.....	do ⁴	Do.
Wednesday	May 20	440,000	440,000	do.....	do ⁴	Do.
Thursday..	May 21	573,000	573,000	do.....	do ³	Do.
Thursday..	May 21	1,250,000	1,250,000 ⁷	New York....	Mechanicsville.	Hudson River.
Friday....	May 22	300,000	300,000	Maryland....	Battery Station ³ .	Susquehanna River.
Saturday..	May 23	674,000	674,000	do.....	do ³	Do.
Sunday....	May 24	500,000	500,000	do.....	do ³	Do.
Sunday....	May 24	1,500,000	1,500,000 ⁷	Virginia.....	Danville.....	Dan River.
Monday....	May 25	125,000	125,000	Maryland....	Battery Station ³ .	Susquehanna River.
Tuesday...	May 26	150,000	150,000	do.....	do ³	Do.
Wednesday	May 27	100,000	100,000	do.....	do ³	Do.
Wednesday	May 27	250,000	250,000	do.....	North East ²	North East River.
Thursday..	May 28	250,000	250,000	do.....	Railroad cross- ing. ²	Gunpowder.
Saturday..	May 30	250,000	250,000	do.....	Relay House ² ...	Patapsco River..
Monday....	June 1	251,000	251,000	do.....	Elkton ²	Elk River.
Wednesday	June 3	270,000	270,000	do.....	do.....	Chester River. ³
Friday....	June 5	200,000	200,000	do.....	Bush Station.....	Bush River. ²
Saturday..	June 6	158,000	158,000	do.....	Battery Station ⁵ .	Susquehanna River.
Saturday..	June 6	500,000	500,000	Pennsylvania.	Sunbury ²	Do.
Tuesday...	June 9	400,000	400,000	do.....	do..... ²	Do.
Wednesday	June 10	601,000	601,000	Maryland....	Battery Station ⁵ .	Susquehanna River.
Thursday..	June 11	33,000	33,000	do.....	do ⁵	Do.
Thursday..	June 11	25,000	25,000 [*]	do.....	do ⁵	Do.
Total	10,725,000				

¹ By William Hamlen.² By F. L. Donnelly.³ By Sauerhoff & Tolbert.⁴ By G. H. Tolbert.⁵ By W. P. Sauerhoff.⁶ Delivered to N. Simmons.⁷ Delivered to car No. 3.^{*} This deposit was of eggs almost on the point of hatching.

135.—SALTING ROE IN NORWAY.*

Roe did not become an article of commerce in Norway until the second half of the seventeenth century. About the year 1650 the quantity of roe annually exported from Bergen was only 9 barrels, and from Trondhjem in 1665, about 200 barrels. At the close of the seventeenth century Bergen annually exported 800 barrels, Christiansund 100, and Trondhjem 700. About the middle of the eighteenth century the quantity of roe exported from Norway had increased to 8,000 barrels per year, and toward the end of the century to nearly 13,000 barrels. From 1830 to 1850 it was a little above 20,000; from 1851 to 1865, about 30,000, and from 1866 to 1875, about 40,000 barrels annually. Since then it has risen to 50,000, and in 1880 to 70,000 barrels. On an average since the middle of the last century one barrel of roe has been exported annually to a thousand kilograms of fish.

*"Saltning af Rogn." From the *Norsk Fiskeritidende*, vol. iv, No. 1, Bergen, January, 1885. Translated from the Danish by HERMAN JACOBSON.

The roe trade is somewhat of a hazard. We have but few competitors in the world's markets, as five-sixths of the 60,000 barrels of roe which were brought to market came from Norway. The market, however, is limited, and insignificant changes in the supply or demand will influence the price. There is no product of the fisheries which varies so much in price as roe; thus, the price of roe at the Loffoden Islands has varied from \$3.75 to \$12.33 per barrel during the period from 1860 to 1884.

To buy roe requires a certain degree of experience. As roe is a costly article, the aim of the seller frequently seems to be to make it go as far as possible. Positive frauds are perpetrated by mixing with the roe of the common cod (*Gadus morrhua*) the less valuable roe of the pollock (*Gadus virens*),* or by placing in the middle of the barrel salt, pieces of ice, soft roe, empty roe-bags, fish-heads, and entrails, and good roe at the top and bottom. As such frauds have occurred, people who buy roe should be on their guard. If a person who buys roe has no chance to examine the contents of the barrels, and buys of people whom he does not know, or who are not trustworthy, it is a good plan to cause the seller to brand the barrel with his mark, as frauds are likely to be detected when the roe is repacked for shipping, although the inconvenience occasioned thereby will frequently be greater than the loss. Other means, not exactly unlawful but objectionable, are also employed to give the barrel the appearance of being full. Such attempts at fraud will be made as long as there are buyers to whom roe can be sold to advantage, and as long as there are persons who have not yet found out that the best and most profitable results are obtained by careful treatment of the roe. We shall have occasion again to speak of these tricks of the trade.

In cutting open the fish care should be taken not to injure the roe-bag, as in opening the fish the knife is very apt to cut the roe. The person who takes out the roe should also be careful not to remove at the same time portions of the entrails, as is sometimes done. The tubs in which the roe is gathered should have holes through which the water can run off, as thereby salt is saved and a better article of roe is obtained. Whenever it is possible to let the roe stand for half a day, so that the water can all flow out, this should not be neglected. Roe would better be salted in perforated barrels so that the brine can run off freely, as the brine makes the roe soft and less liable to keep. Generally twelve holes are made in the sides of the barrel, and four in the bottom. If roe is to be laid in brine† either it should be put in perforated tubs and salt sprinkled over it, or it should be dry-salted for from eight to fourteen days before it is put up in tight barrels.

* The grains of roe of the *Gadus virens* are, as a rule, more pointed and of unequal length. This roe also has a dark color, and becomes darker with age.

† Roe laid in brine, of which formerly a good deal was used on the south coast of France, finds scarcely any sale at present.

Thirty kilograms of salt is considered a sufficient quantity for one barrel of roe. As regards the kind of salt to be used, it will depend how soon one desires the roe to become salted. A regulation of September 12, 1753, prescribed that only French salt should be used, and St. Ives salt was positively prohibited. At the present time, however, medium coarse-grained salt is preferred, especially Cadiz salt, and also St. Ives or fine Lisbon salt. Coarse salt should not be used, as the coarse grains are apt to spoil the looks of the roe-bag, by becoming imbedded in it, and give it a burnt look. While the roe is being salted it should not be pressed. When, after a week's time, it has settled somewhat, the barrel is filled, previously salted roe of the same quality being put at the bottom. It is then closed, so as to prevent the air from affecting it, and is put in a dry place. The barrel should be laid on its side, as otherwise the lower layers are subjected to too great a pressure. For the same reason, it should be turned from time to time. While the roe is salted and is settling it should not be exposed to frost, but after the roe has absorbed the necessary quantity of salt, it can stand much cold before it freezes. Nothing but firm roe should be used for salting. Roe which is almost ready for spawning, soft roe, and roe from fish which have lain some time or which are spoiled, as well as roe-bags which have been half emptied, should, if used at all, be salted separately. Every salter should be very careful in sorting the roe. Badly sorted roe always awakens suspicion, and will, as a rule, bring a lower price than it deserves, while roe which has been well sorted during salting becomes more valuable from the mere fact that it will keep better, so that when it is to be repacked for shipping it need not all be taken apart. The number of roe-bags in a barrel varies greatly. If the roe is of prime quality it can vary between 200 and 400; on an average, however, the number is 300, or somewhat less.

Many people salt the roe in boxes and afterwards transfer to barrels. This method does not improve the quality of the article, if the roe is firm. It requires more salt and labor, exposes the roe to the effects of frost and air, which exposure is apt to make it dry and hard, and there is likewise danger of its being broken too much during this treatment. If care is not exercised in the use of salt when the roe is transferred to the barrels, it is apt to become "salt-burned." Roe which has been salted too much is hard and dry, loses its natural pale-red color, and becomes dark and brittle. If the roe is loose, salting it again will give it greater consistency. If properly treated, even soft roe will make a first-class article. This is done by salting it as soon as it is taken from the fish, by using more salt than for the firm roe, or by salting it a second time, when care, however, must be taken not to use too much salt. Occasionally it may become necessary to salt roe in boxes, because this affords more space, but more frequently the reason is that when it is re-salted the volume is increased, partly by the salt which is employed and partly because it does not have time to settle sufficiently before it is

sold. The difference between the contents of a barrel which has been resalted and one where this has not been done is often as much as 30 per cent, 12 per cent of which is caused by the salt. Before the roe is shipped it should, therefore, be allowed to stand and settle for a week. We must not fail to mention that the temptation is very great, and in most cases irresistible, to mix inferior roe with the good during the re-packing. Every buyer of roe should therefore be on his guard when he buys roe which has been repacked, and examine not only its quantity and quality, but also whether it has been salted too much. Roe salted in boxes is never as valuable as roe salted in barrels, even if the raw material was the same. When salted in barrels it settles so firmly that all air is excluded, while there will always be more or less air between the layers if the roe has already reached a certain degree of stiffness before it is put into the barrels. Roe put up in barrels to begin with will therefore keep much better than roe which has been repacked, and will for this reason alone be more valuable.

Some people are in the habit of laying the roe in snow and of not salting it until it is to be sold, which custom is very objectionable. When under the snow, water penetrates the roe and freezes, so that for a little while it retains an artificial firmness. But the advantage to the seller is only an imaginary one, as only very inexperienced buyers will be deceived thereby. On the other hand, the seller runs the risk of losing a good deal, as roe put under the snow is apt to turn sour and lose its value. Sour roe, when salted, becomes brittle and is apt to crumble to pieces during the process. It can be detected at once by its odor. The Loffoden fishery law of July 1, 1816, and the Finmark fishery law of September 13, 1830 (which last-mentioned law is still in force, although it is of little practical value), prohibited the putting of roe under the snow for more than twenty-four hours before salting. As far as the Loffoden Islands are concerned, the law is no longer in force, and it is considered very objectionable to put roe under the snow.

Fresh roe freezes when the temperature is two or three degrees below zero (Réaumur). In frosty weather the tubs with roe should, therefore, be protected against the cold, either by covering them or by placing them in a closed shed; and the salting should begin before the roe commences to spoil. Frozen roe should never be salted, as the salt melts before the roe is entirely thawed out, and a great portion of it is therefore not exposed to the influence of the salt. If, as may happen, it freezes without any fault of the salter, it should for some time be laid in salt water, or, still better, in brine, before it is salted. It is not advisable to defer the salting until milder weather sets in, and the roe thaws of itself, as this will generally tend to make it sour. Nor should it be laid in snow for the purpose of thawing it, unless it can be salted within a couple of days.

In order to make a certain quantity of roe go a long way, it is in some places salted in a mild brine, whereby it retains more water than

if it had been salted in salt, as the salt diminishes the quantity of water in proportion to the quantity of salt used. When salted in mild brine, the roe, if allowed to stand too long, begins to ferment. When such roe is to be sold, it is packed into a barrel, if brine roe is asked for, or it is put in a perforated barrel if the buyer wants dry-salted roe. Such roe can always be recognized by its being soft. It takes it a longer time to settle completely, and decay may have set in, without any noticeable indications. Roe salted in brine, which is afterwards to be dry salted, very soon becomes dark and brittle. Buyers should therefore be careful not to be imposed upon by such an article, which ought never to be prepared.

Referring to the above, we must consider as not advisable :

- (1) To thaw roe in snow, or during mild weather.
- (2) To salt roe in boxes.
- (3) To use coarse salt.
- (4) To use too much salt.
- (5) To expose the roe to frost before it has absorbed a sufficient quantity of salt.

On the other hand we recommend :

- (1) To let the water run off before the salting begins.
- (2) When there is frost, to salt the roe as soon as possible, or in case it should already be frozen, to thaw it in salt water or brine.
- (3) To use the dry-salting method.
- (4) To salt the roe in barrels.
- (5) To use Cadiz, St. Ives, or fine Lisbon salt.
- (6) To fill up the barrels as soon as the roe has sufficiently settled, and then to close the barrels at once.
- (7) To let the barrels lie for a while after they have been closed.
- (8) To be very careful in sorting the roe.
- (9) To use more salt for loose roe, or to salt it a second time.

As altogether objectionable we must mention :

- (1) To keep roe in snow for a considerable length of time.
- (2) To salt frozen roe.
- (3) To salt the roe first in brine and afterwards in dry salt.

In sorting roe the following three sorts should be distinguished:

First quality, full and perfect roe.

Second quality, torn, frozen, or salt-burned roe, or roe some of which has been lost by spawning.

Third quality, roe of which there is hardly anything but the bags, and sour roe.

All roe is turned when it is to be shipped; and when this is done it will be found difficult in well-sorted roe to separate the different bags. Very little salt is used (about two or three barrels to one hundred barrels of roe), and this especially at the bottom of the barrel. In France this latter process is omitted.