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An Experiment in Raising the Salt Content of Oysters From Low
Salinity Waters to Improve Their Taste

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INTRODUCTION

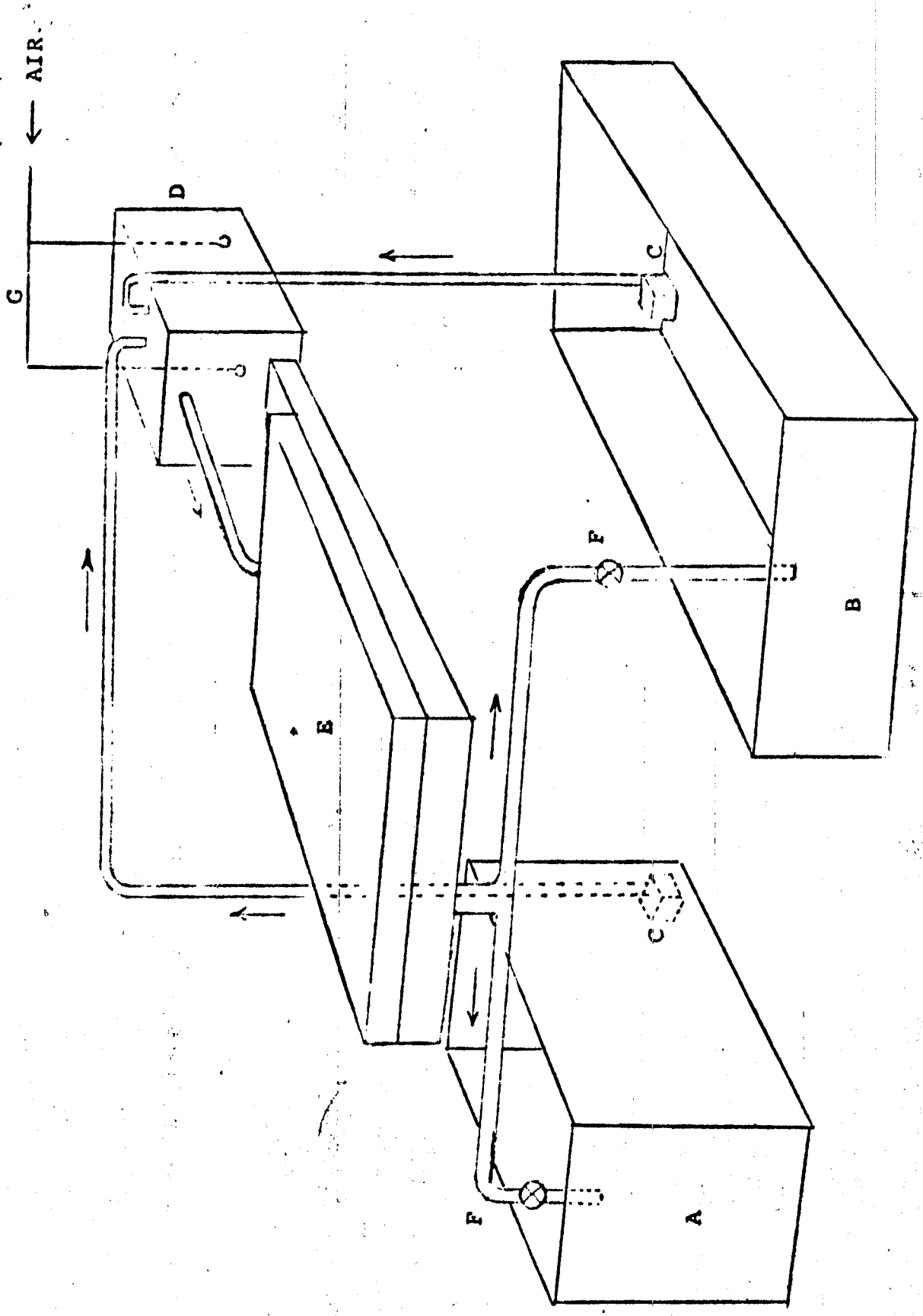
An experiment was conducted at VIMS in Gloucester Point between July 19 and 20, 1979, in which oysters harvested from low salinity water at Pocomoke Sound (12‰) were held in water of relatively high salinity (25.5‰) to improve their taste. This study was done in cooperation with H. V. Drewer and Sons of Saxis, Virginia.

METHODS

Experimental Setup - An Overview

The experimental setup consisted of a system in which water was recirculated between two wooden tanks, an overhead reservoir and a twelve-lamp ultraviolet radiation unit as shown in the attached diagram (Figure 1). Tanks A and B were filled with York River water the salinity of which had been raised to 25.5‰ from its initial 18‰ by addition of granulated salt. Tanks A and B are described in the following paragraph.

Water was pumped simultaneously from the bottom of the tanks with small submersible pumps to a reservoir box (D) with a capacity of 33 gals. The reservoir box overflowed into a shallow wooden box with a cover fitted with 12 36-inch ultraviolet lamps. The UV treatment was directed toward elimination of bacteria in the water. From the ultraviolet



lamp box, water flowed back into the two tanks at the end opposite to the location of the pumps. Flow to the tanks was equalized by adjustment of ball valves (F). The water in the system was aerated through tubes (G) introduced into the reservoir box (D).

Description of Tanks

Tank A was constructed of 3/4-inch plywood coated with fiberglass resin. It measured 4 ft in length, 22½ inches in width and 33 inches in depth at the inflow end. The floor had a grade of 0.9 inches/foot. Volume capacity was 155 gals at its effective water depth of 30 inches.

Tank B was also constructed of 3/4-inch plywood and coated with fiberglass resin. It measured 7 ft 9 inches in length, 4 ft in width and 18 inches in depth. Volume capacity of the tank was 253 gals at its effective water depth of 14½ inches.

Ultraviolet Sterilization

As the water was cycled through tanks A and B, it was sterilized by ultraviolet light. The ultraviolet water treatment unit was constructed of 3/4 inch plywood coated with fiberglass resin. It measured 68½ inches in length, 32½ inches in width and the lower section into which the water flowed was three inches deep. The UV lamps were affixed to the unit cover and the distance from the center of the lamps

to the bottom of the unit was five inches. Water depth in the box was maintained at between $\frac{1}{2}$ and $\frac{3}{4}$ inches.

Trays

The wire trays in which oysters were held while in the tanks were made of one-inch mesh heavy wire coated with PVC. They measured 41 inches in length, 19 inches in width and were 4 inches deep.

Experimental Procedure

The two tanks and the overhead reservoir were filled to capacity with unfiltered York River water at ambient temperature (26°C) and salinity ($18^{\circ}/\text{oo}$). Granulated salt in the proportion required to raise the salinity of the water to $26^{\circ}/\text{oo}$ in each tank was dissolved in a plastic tub with York River water and added to the tanks and the reservoir. Water was recirculated through the system for fifteen minutes before the oyster trays were introduced into the tanks.

Ten bushels of oysters were received at VIMS around 9:30 a.m. on July 19 in an unrefrigerated truck. They were transferred to twelve rectangular wire trays and hosed down with potable fresh water. The 18 hour and 24 hour groups were introduced into the tanks at 1:30 p.m. The exposure time, tray numbers and dates are shown in Table 1.

Position of Trays

Four of the trays were placed in Tank A stacked one over the other with a spacing of two inches above the tank

Table 1

Exposure time and dates of exposure of oysters in salting study.

<u>No. Trays</u>	<u>No. Bushels</u>	<u>Hours Exposed</u>	<u>In Tank</u>	<u>Out of Tank</u>
4	3.3	12	July 20 (1:30 a.m.)	July 20 (1:30 p.m.)
4	3.3	18	July 19 (1:30 p.m.)	July 20 (6:30 a.m.)
4	3.3	24	July 19 (1:30 p.m.)	July 20 (1:30 p.m.)

bottom and one inch between trays. Another four trays were placed in Tank B side by side with their long axes across the width of the tank. The trays were elevated three inches off the bottom. The other four trays (12 hour salting) were held out of the water in a cold room at 68°F (20°C) for introduction halfway through the experiment. At that time they were placed in Tank B over the four trays already there with a spacing of one inch separating the two layers of trays.

Removal of Oysters from Tanks

The oysters in Tank A were taken out of the tank at 6:30 a.m. on July 20 after 18 hours of exposure and held in a cold room until the end of the experiment. The bottom layer of trays in Tank B stayed in the tank for 24 hours while the top layer of trays in the same tank were held in the water for only 12 hours (Table 1).

Water temperature in the tanks during the course of the experiment ranged between 28 and 29°C (82-84°F).

Evaluation of Results

At the termination of the experiment, 1:30 p.m. on July 20, the oysters were transferred to baskets and carried back to Saxis in a refrigerated truck. Fifty oysters were taken out of each of the three groups (12, 18 and 24 hours) for taste tests and condition index analysis before shipping.

Condition Index

Condition of oysters is a number based on the weight of the dry meat weight of oysters divided by the size of the shell cavity as follows:

$$\frac{\text{dry meat wt. in grams} \times 100}{\text{shell cavity size cc}} = \text{Condition index}$$

The techniques followed to arrive at the indicated measures will not be discussed. It is sufficient to state only that the condition index is a widely accepted measure for meat quality. A condition index of 7.0 is average for Virginia; an index of 8.0 and over indicates high quality meats.

Taste Tests

Groups of oysters were given to two individuals to determine if holding noticeably increased the "salty" taste.

RESULTS

1. The study proceeded without any unusual mortality. There was the usual foaming of the tanks due to holding oysters in recycled water.
2. The design of Tanks A and B were satisfactory.
3. Holding oysters in recycled water for 24 hours did not reduce meat quality. This is apparent when the condition index at 12, 18 and 24 hour oysters held at 25.5‰ is compared

to those which were not held in high salinity water. It was 9.2 prior to salting and 8.8 at 24 hours. This change is not regarded as significant. Moreover, there was no significant change in water content of the meats during the study (Table 2).

4. Oysters were taste tested by Mr. Dexter Haven and Mr. Lowell Fritz at VIMS. The more salty taste of those held in the recycled 25.5‰ waters was easily detected. There was some indication based on Mr. Haven's results that salting for 24 hours resulted in a more salty taste (Tables 3 and 4).
5. The oysters held in the tanks were sent back to the H. V. Drewer and Sons Company for further evaluation.

CONCLUSIONS

1. "Salting" increases the salty taste of oysters.
2. Salting for 24 hours is probably better than 12 or 18 hour periods.
3. Salting did not change condition index or water content of the meats.
4. There was no unusual mortality.
5. One more test is needed to confirm these results.

Table 2

Data on meat quality of oysters exposed to a salinity of 24‰ for varying periods.

	<u>0 Hr</u>	<u>12 Hrs</u>	<u>18 Hrs</u>	<u>24 Hrs</u>
Condition index	9.2	9.7	9.5	8.8
% dry weight	21.1	24.6	19.2	21.4

Table 3

Taste test on salting oyster by Dexter Haven

Oysters salted for 12, 18 and 24 hrs were set out for Mr. Haven to taste. He was not informed if any or if all had been subject to salting in the tanks.

In taking part in this test, Haven thought some of the oysters had not been held in the tank. This was not correct anytime.

There were six groups of two oysters tested as follows.

<u>Group No.</u>	<u>Oyster</u>	<u>Salting Time (Hrs)</u>	<u>Haven's Opinion</u>
1	a	12	Low salinity
	b	12	Not tasted
2	a	24	High salinity
	b	24	Not tasted
3	a	24	High salinity
	b	24	Not tasted
4	a	18	Not tasted
	b	18	Low salinity
5	a	12	Low salinity
	b	12	Some salting
6	a	18	Salted 18 hrs or not at all
	b	18	Low salt

Table 4

Taste test on salting oysters by Lowell Fritz.

Mr. Lowell Fritz tasted six oysters.

<u>Oyster</u>	<u>Salting Time</u>	<u>Fritz' Opinion</u>
1	18 hrs	Plump meat; salted 24 hrs
2	Not salted	Tasted fresh
3	24 hrs	Meat not a firm as (1); salted
4	12 hrs	Meat looks poor; salted 18 hrs
5	Not salted	Tasted fresh