

SOME DATA ON pH AND FRESHNESS OF SHUCKED EASTERN OYSTERS

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INTRODUCTION

Several years ago, various methods for determining the relative freshness of shucked Eastern oysters were investigated by Baldwin, Puncchar, and Pottinger (1941) at the Fishery Technological Laboratory, College Park, Md.

In addition to pH values, other measurements, such as changes in water soluble nitrogen, alcohol soluble nitrogen, and total titratable acids during storage of the oysters were made. Of these tests, the first seemed to be the most promising from the standpoint of rapidity and ease of manipulation, as well as reliability of results.

Data on the correlation of pH with oyster freshness had previously been published by other workers. Hunter and Linden (1923) found indications of a relation between pH of the oyster liquor and the odor and appearance of the oysters. They concluded that pH values between about 6.1 and 5.6 represent a zone in which oysters are passing from good to stale. Hunter and Harrison

(1928) state that pH measurements may be of value in examining shucked oysters of questionable quality. As a result of more recent work, Piskur (1947) concluded that pH measurements may possibly be of value as an objective index of quality of shucked Pacific oysters.

In conjunction with other studies being made with shucked Eastern oysters in the College Park Laboratory several years ago, additional pH values and their relation to the degree of freshness were obtained for a number of samples of commercially shucked oysters and those shucked and blown in the laboratory. These findings are the basis for this report.

EXPERIMENTAL PROCEDURE

Arrangements were made with oyster producers to forward to the laboratory at College Park, during the season 1940-41, samples of shucked oysters that had been handled in the usual commercial manner together with a quantity of shell oysters such as were furnished to the shuckers. Both lots were to be taken, as nearly as possible, from the same lot of shellstock. Shipments were received at

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intervals during the oyster season from the more important producing areas located from Rhode Island to Louisiana.

The pH of the commercially shucked oysters was determined upon their arrival at the laboratory. The shell oysters were shucked and then washed and blown in a small blowing tank of the design used in commercial shucking houses. The initial pH of these oysters was also measured. All samples were then held in closed glass containers packed in crushed ice for storage studies and pH values were determined at regular intervals. All pH determinations were made with a glass electrode.



At the beginning of the tests, pH determinations were made on both the oyster liquor and finely ground oyster meats. It was found that the initial pH of the liquor was somewhat higher than that of the meats but the two values were almost equal after a storage period of about a week or ten days.

For purposes of making the test, the liquor was found to give satisfactory results, thus eliminating the grinding that is required when using oyster meats. The odor of the combined oysters and liquor was noted at the time the pH values were determined.

DISCUSSION

Results in Table 1 include only those for oysters which arrived at the laboratory without delay and were well iced in transit. The initial values shown for the commercially shucked oysters represent the pH at the time of arrival at the laboratory and are not necessarily the same as might be obtained with oysters immediately after being prepared at the plant. The data for commercially shucked oysters and laboratory shucked oysters are paired when possible.

With only two exceptions, the commercially shucked oysters had an initial pH of 6.2 or above. All of the samples that were shucked and blown in the laboratory had an initial pH above 6.2. Some variation in pH was found in both groups.

During storage, the pH decreased gradually as the oysters became less fresh. For purposes of setting some arbitrary standard of comparison, the oysters were considered to be on the verge of inedibility when a distinct "off odor," no longer associated with that of "fresh" oysters, was noticeable. The bulk of the samples remained in good condition for ten days to two weeks before the off odor became apparent. The pH values of all of the oysters at the time the off odor was first noticed varied between 5.96 and 5.65.

It may be of interest to note that the average value for the commercially shucked oysters at this time was 5.81 (standard error of 0.036) and for the laboratory prepared samples, 5.79 (standard error of 0.015). Since the standard errors are so small, it indicates that the individual data obtained range very closely around the mean. The pH continued to decrease during storage, with the oysters becoming progressively more sour and changing markedly in appearance. For most

samples, the time required for an "off odor" to develop after the liquor reached a pH of 6.0 or 5.9 varied between three and six days.

Table 1 - pH of Liquor from Shucked Eastern Oysters Initially and at Time "Off Odor" was First Noticed

Source	Commercially shucked oysters		Laboratory shucked oysters	
	Initial	Off odor	Initial	Off odor
Rhode Island	6.38	5.80	6.40	5.70
" "	6.40	5.88	6.30	5.84
Connecticut	6.26	5.72	6.45	5.94
"	6.32	5.78	6.32	5.72
New York	6.60	5.76	6.60	5.88
" "	6.20	5.82	6.30	5.75
" "	6.35	5.78	6.34	5.72
New Jersey	6.24	5.82	6.22	5.85
" "	6.20	5.96	-	-
Maryland	6.22	5.88	6.48	5.72
"	6.60	5.96	6.60	5.82
"	6.70	5.80	6.60	5.70
"	6.38	5.80	-	-
Virginia	5.75	5.80	6.82	5.75
"	6.52	5.80	6.45	-
"	6.40	5.92	6.52	5.78
"	6.42	5.82	6.32	-
North Carolina	6.60	5.82	6.60	5.78
Georgia	6.62	5.75	6.75	5.80
"	-	-	6.38	5.80
Alabama	6.10	5.80	-	-
Louisiana	6.30	5.82	6.26	5.76
"	6.25	5.75	6.30	5.80
"	6.20	5.85	6.28	5.84
"	6.10	5.65	-	-
Average value	6.38	5.81	6.44	5.79
Standard error		0.036		0.015

* Upon arrival at the laboratory.

These data were obtained from a relatively few samples and are not meant to be used alone as a basis on which to determine freshness of oysters. Very little information is available regarding possible variations in pH values which may occur due to season, location of oyster beds, and other factors. The data do indicate, however, that pH values are a useful index in following changes in the degree of freshness of shucked Eastern oysters and should have some value in indicating quality when used in conjunction with other tests.

LITERATURE CITED

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