SUGGESTIONS FOR BRINING PICKLING CUCUMBERS—THE USE OF EQUILIBRATED BRINE STRENGTHS, BASED ON THE AVERAGE BRINE-CUCUMBER-MASS TEMPERATURE

by

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Introduction

Step-by-Step Brining Instructions given herein are referred to as, “The 25° Salometer Brining Treatment.” This treatment has been especially designed for geographical areas of the country (USA) where the cucumber-brine temperature, during the regular cucumber harvest period, is the approximate center of the brined mass, ranges from about 70 to 80°F, but usually averages a little above 75°F. Where brine temperatures are in the 60-85°F range, a 28° salometer cover-brine should be used; and, for brine temperatures averaging 86°F and above, a 30° salometer cover-brine is desired. If brine temperatures are consistently two or more degrees below 70°F, a 20° salometer cover-brine is suggested. For the three cucumber-brine temperature ranges mentioned—other than the 25° salometer treatment—the needed basic brining information can be obtained from the accompanying table.

In the pickle industry, brine salinity is usually recorded in degrees salometer as measured by a hydrometer calibrated in percentage saturation with respect to salt (= sodium chloride = NaCl). Thus, 100° salometer = 26.4% NaCl tested at 60°F. If, for example, the equilibrated cover-brine strengths discussed herein (20 to 30° salometer) are tested at temperatures of 70 and 80°F, then 0.089° salometer should be added for each degree of temperature above 60°F. Accordingly, for a 25° salometer brine, increases for the two brine temperatures cited, would amount to about 1 and 2° salometer, respectively. For stronger brines—31-60° salometer—tested at 70 and 80°F, the corrected readings would amount to only about 0.2 to 0.4° salometer higher than those given above for 20 to 30° salometer brines.

The 25° Salometer Brining Treatment

1. PUT a 6 to 8-inch cushion of 25° salometer brine (6.6% salt by weight) into a well-cleaned tank.
2. FILL the tank heaping full with freshly harvested cucumbers, either graded to size (No. 1’s = up to 1-1/16 inches in diameter; No. 2’s = 1-1/16 to 1-1/2 inches; No. 3’s = 1-1/2 to 2 inches) or field-run. Allow the stock to settle to about 1-foot below the top of the tank. Keep a record of the number of 50-lb bushels or total weight of cucumbers in the tank in cwt’s (100-lbs). You may have to refill the tank at least once, to get the desired cucumber to brine ratio (65:35% by wt).
3. COVER the cucumbers with a “false” head of loosely constructed, wooden boards about 1-inch thick, keyed down securely with 2 x 4 inch or 4 x 4 inch lumber of appropriate length. The head-boards should provide plenty of avenues for the fermentation gas to escape.
4. ADD 25° salometer brine until the brine level is 4 to 6 inches above the head-boards and about 4-inches below the top of the tank. Remember, depending on the size of the tank being used, nearly a ton or more of dry salt may have to be put on the head, and this will take up space, either in the solid or dissolved state!
5. ASSUMING we are brining a 2-bushel tank of cucumbers (25,000-lbs – 250 cwt); add the calculated amount of salt on the head to maintain the initial salt concentration of 25° salometer.
   This amount to about 6-lbs of salt for every 100-lbs (cwt = 2-bu) of cucumbers in the tank, or a total of 1500-lbs. Add about 2/3 of the salt on the head at this time (≈ 4- lbs per cwt or 1,000-lbs); then, add the remainder (≈2- lbs per cwt or 500-lbs) 12 to 30 hours later. For small sizes, add the remaining salt after 12-18 hours; but, for large sizes, it should be added after 24-30 hours.
6. MAINTAIN the brine strength at 25° salometer until about 0.60% brine-acid is formed (calc. as lactic); this usually takes 7-12 days at brine temperatures in the 75-78°F range.
7. THEN, raise the brine strength gradually (by addition of dry salt on the head) at the rate of 3 to 5° salometer per week up to 55-60° salometer and maintain at that concentration. About 1/2-lb of salt is required for every 100-lbs of cucumbers in the tank to raise the brine strength 1° salometer. On a per bushel basis, this amounts to 1/4-lb (1° salometer = 0.26% salt/wt). This is based on a ratio of cucumbers to brine of 65:35% by weight.
8. IF, for any reason, the desired brine acidity has not been reached in about 21 days, the brine strength should, nonetheless, be increased (Item 7).
9. IMPORTANT: If small-size cucumbers (No. 1’s, up to 1-1/16 inches in diameter and 2A’s, 1-1/16 to 1-1/4 inches) are being brined, the original cover-brine should be drained off 36-48 hours after filling and brining the tank, and replaced with a new brine of the same strength (25° salometer). This procedure is designed to drain away naturally-occurring, softening enzymes that otherwise would deteriorate the texture of the brined material. The draining procedure is a necessary and widely accepted practice in southeastern and southwestern brining areas of the country.
<table>
<thead>
<tr>
<th>Expected average brine-cucumber-mass temperature¹</th>
<th>Brine strength at equilibration:</th>
<th>Cover brine strength used</th>
<th>Approximate amount of dry salt to add on head-boards</th>
</tr>
</thead>
<tbody>
<tr>
<td>in °F.</td>
<td>Desired ° salom.²</td>
<td>Acceptable ° salom.²</td>
<td>° salom.</td>
</tr>
<tr>
<td>68 &amp; below (cool to very cool)</td>
<td>20</td>
<td>18-20</td>
<td>25</td>
</tr>
<tr>
<td>69 to 75 (cool to mild)</td>
<td>25</td>
<td>23-25</td>
<td>25</td>
</tr>
<tr>
<td>76 to 80 (mild to warm)</td>
<td>25</td>
<td>25-27</td>
<td>25</td>
</tr>
<tr>
<td>81 to 85 (warm)</td>
<td>28</td>
<td>27-29</td>
<td>25</td>
</tr>
<tr>
<td>86 &amp; above (very warm)</td>
<td>30</td>
<td>30-32</td>
<td>25</td>
</tr>
</tbody>
</table>

¹The "Cucumber-Brine-Mass Temperature" can be estimated provided one knows: the average cucumber temperature, the cover-brine temperature, and the expected percentages of cucumbers and brine by weight, when the tank is filled, headed, and brined. Now, assuming the cucumber temperature is 75 °F, the brine temperature 60 °F, and the percentages of cucumbers and brine figured at 65% and 35% by weight, then, the formula is:

$$T = \frac{\text{cucumber percentage} \times \text{cucumber temperature}}{100} + \frac{\text{brine percentage} \times \text{brine temperature}}{100}$$

Example: $T = \frac{(65 \times 75)}{100} + \frac{(35 \times 60)}{100} = \frac{4875}{100} + \frac{2100}{100} = 69.75$ or about 70 °F.

²The equivalents in percentage of salt by weight for 20, 25, 28, 30, and 35 ° salometer brines would be about 5.3, 6.6, 7.4, 7.9, and 9.2%, respectively.

³Cwt means per hundred weight, or 100-lbs.

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