SUGGESTIONS FOR BRINING PICKLING CUCUMBERS —THE USE OF EQUILIBRATED BRINE STRENGTHS, BASED ON THE AVERAGE BRINE-CUCUMBER-MASS TEMPERATURE[1]

by

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Introduction

Step-by-Step Brining Instructions given herein are referred to as, "The 25° Salometer Brining Treatment."[2] This treatment has been especially designed for geographical areas of the country (USA) where the cucumber-brine temperature, during the regular cucumber harvest period, at 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 80-85°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.

[2] *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 cwts (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 500-bu 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 amounts 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.

Brining Cucumbers: Suggested Equilibrated Brine Strengths, Based on the Average Brine-Cucumber-Mass Temperature

Expected average brine-cucumber-mass temperature [1]	Brine strength at equilibration:		Cover brine strength used	Approximate amount of dry salt to add on head-boards	
	Desired	Acceptable		At start	Next day
in °F.	° salom. [2]	° salom. [2]	° salom.	lbs/cwt of cucumbers [3]	lbs/cwt of cucumbers [3]
68 & below (cool to very cool)	20	18-20	25	3	1
			30	2	1-1/2
			35	2	1
69 to 75 (cool to mild)	25	23-25	25	4	2
			30	3	2-1/4
			35	3	1-3/4
76 to 80 (mild to warm)	25	25-27	25	4	2
			30	3	2-1/2
			35	3	1-3/4
81 to 85 (warm)	28	27-29	25	5	2
			30	4	2-1/2
			35	4	2
86 & above (very warm)	30	30-32	25	5	3
			30	5	2-1/4
			35	4	2-3/4

[1] The "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:

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

Example: $T = \frac{(65 \times 75) + (35 \times 60)}{100} = \frac{4875 + 2100}{100} = \frac{6975}{100} = 69.75$ or about 70°F.

[2] The 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.

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

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