ADVISORY STATEMENT ON OVERNITE DILLS:[1,2]--PART I:

QUALITY OF REFRIGERATED, ACIDIFIED OVERNITE DILLS; BRINE ACID AND pH EQUILIBRATION TIMES FOR GREEN-STOCK PACKED IN 1-GALLON GLASS JARS AND STORED AT 38-40°F (ca. 4 to 6°C).

SUMMARY: Acidified, overnite dills were made in 1-gallon containers under laboratory conditions using conventional methods, except no chemical preservatives were used and, the cucumbers, cover-brine, acetic acid, and other ingredients were first cooled to 38 to 40°F (4 to 6°C); storage of the gallon jars of pickles was at the same temperature. It was apparent that the brine acid reached equilibrium several days before brine pH. Further, the natural green cucumber color desired by certain consumer areas for this product could be maintained for about three to four weeks at a brine pH that would meet the requirements for Good Manufacturing Practices (GMP), namely, 4.5 to 4.6.

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[2]Published by: Pickle Packers International, Inc., P. O. Box 31, St. Charles, Illinois 60174, USA, and distribution in cooperation with the North Carolina Agricultural Experiment Station, Department of Food Science, North Carolina State University, Raleigh, and U.S. Department of Agriculture, Agricultural Research Service, P. O. Box 5578, Raleigh, North Carolina 27607, USA.

PROCEDURE:

1. Cucumbers: Six bushels (requested for several experiments). Mostly No. 2's, 1-3/8 to 1-1/2 inches in diameter; one lot of field run. All lots stored in 50°F refrigerator overnight.

2. Source: Grown in Mexico and shipped from Texas by air freight, in wooden crates, wire bound, and so constructed to provide for adequate ventilation during transit.

3. Condition of stock: Good condition; some desiccation noted at stem end, some broken, but little or no disease or rot noted.

4. Pre-brining treatment: For above titled experiment, the stock, after packing in 5 jars (1 gal.), was washed in several changes of warm water then chilled to 40°F with ice and water and stored overnight at 40°F. Pack-out was about 60% cucumbers and 40% brine by weight.

5. Brine used: The 40°F cold water was poured off and replaced with a cold 18 to 22° sal. cover brine; about 13-1500 ml/gal. jar.

6. Preservatives added: None.

7. Acidification: 25-26 ml of 10% acetic acid added at time of brining; exceptions, Nos. 5 and 6, both of which received only 1/2 the required acid at the outset; No. 5 received the balance of acetic acid (13 ml) 24 hours after brining; No. 6, 48 hours after brining; see Table 1.

8. Spicing: 10 ml of dill concentrate emulsion added at brining, plus 3 tablespoons of whole spices (sanitized in 70% alcohol) and 3 tablespoons of garlic flakes. Jars were capped with White Cap, 6-lug closures (fitted with serum stoppers for sampling) and then shaken well to distribute the ingredients.

9. Sampling: Sampled at intervals for 103 days for pH and acidity. Also, color pictures taken initially and at intervals during storage. Observations were made as to color change of pickles: 0 reading = fresh green cucumber color; 4 = yellowish-straw color of fresh-pack dills.

RESULTS:

Overnite dills were prepared in the conventional manner, except no chemical preservatives were used and all ingredients were cooled to 38-40°F (cucumbers, brine, etc.) and the spices were sanitized. Storage was at 38-40°F throughout the experiment. The pickles were packed in one-gallon jars (about five pounds) using mostly No. 2-size stock (1-3/8 to 1-1/2 inches in diameter)

About 1,500 ml of 20° salometer brine per jar, was acidified to obtain the desired, equilibrated brine pH of 4.6. For acidification, acetic acid was added at the rate of 25 ml of 10% glacial acetic acid. The added acid appeared to equilibrate in 24-48 hours (to about 0.18-0.20%, calculated as lactic); however, the equilibration of the brine pH took considerably longer, one to two weeks, if all the acid was added at the outset (see tabular material given in Table 1).

RESULTS: Cont'd.

If only half of the acetic acid was added at the beginning, and the balance one to two days later, the equilibration was delayed for a period about equal to the time between the first and second addition of acid.

The desired "Raw Green Color" appearance was retained fairly well for about three to four weeks. Storage was at 38-40°F. Then, the color slowly changed to "yellowish-straw" or "fresh-pack" color.

After two months' storage (38-40°F), the brine was essentially clear and the acidity had changed very little, about 0.05-0.08%; and, after 103 days' storage, about 0.11-0.15% brine acid had been formed. By this time, the jars had been removed from the 38-40°F storage 16 times for brine sampling and examination as to appearance.

Two jars were opened at 103 days and were about 70% cured, but received high ratings as to overall quality (texture, flavor, etc.) for commercial use.

TABLE 1

pH EQUILIBRATION OF ACIDIFIED OVERNITE DILLS IN 1-GALLON GLASS JARS, STORED AT 38-40°F

Storage time after brining	Gallon jar number	Examination of the brine			Pickle color rating[3]
		pH	Acidity as:		
			lactic	acetic	
Days	No.		%	%	
1	1	4.05	0.16	0.11	0
	2	3.95	.20	.13	0
	3	4.05	.18	.12	0
	4[1]	4.25	.14	.09	0
	5	4.55	.14	.08	0
2	1	4.30	0.16	0.11	0
	2	4.15	.18	.12	0
	3	4.27	.18	.12	0
	4	4.05	.18	.12	0
	5[2]	4.75	.09	.06	0
3	1	4.42	0.15	0.10	0
	2	4.30	.17	.11	0
	3	4.35	.17	.11	0
	4	4.25	.18	.12	0
	5	4.35	.18	.12	0
5	1	4.30	0.18	0.12	
	2	4.30	.18	.12	
	3	4.38	.18	.12	
	4	4.25	.18	.12	
	5	4.42	.18	.12	
7	1	4.50	0.18	0.12	0
	2	4.43	.18	.12	0
	3	4.47	.18	.12	1
	4	4.40	.18	.12	1-2
	5	4.50	.18	.12	2
11	1	4.45	0.21	0.14	
	2	4.45	.19	.13	
	3	4.48	.21	.14	
	4	4.42	.22	.15	
	5	4.53	.22	.15	
14[4]	1	4.65	0.21	0.14	0
	2	4.63	.22	.15	0
	3	4.65	.22	.15	1
	4	4.58	.22	.15	1-2
	5	4.70	.25	.17	2

[1]Final 1/2 (13ml) of 10% acetic acid added 1 day after brining after sampling.

[2]Final 1/2 (13ml) of 10% acetic acid added 2 days after brining after sampling.

[3]0 Reading = fresh green cucumber color; 4 = yellowish-straw color of fresh-pack dills.

[4]Brine pH's about 0.15-0.2 high (toward 7) based on acidity and pH data for 11 and 21 days.

Storage time after brining	Gallon jar number	Examination of the brine			Pickle color rating[3]
		pH	Acidity as: lactic	Acidity as: acetic	
Days	No.		%	%	
21	1	4.50	0.22	0.15	1
	2	4.50	.24	.16	1
	3	4.53	.23	.15	1-2
	4	4.48	.21	.14	1-2
	5	4.45	.24	.16	2
28	1	4.53	0.23	0.15	
	2	4.50	.24	.16	
	3	4.55	.22	.15	
	4	4.50	.24	.16	
	5	4.58	.26	.17	
34	1	4.50	0.23	0.15	
	2	4.50	.24	.16	
	3	4.50	.23	.15	
	4	4.50	.23	.15	
	5	4.58	.25	.17	
44	1				3
	2				3
	3	(No chemical data)			3
	4				3
	5				2+
48	1	4.45	0.24	0.16	3
	2	4.50	.22	.15	3
	3	4.55	.21	.14	3
	4	4.50	.22	.15	3
	5	4.57	.24	.16	2-3
57	1				4
	2				4
	3	(No chemical data)			4-
	4				4-
	5				3+
61	1	4.44	0.24	0.16	3+
	2	4.38	.26	.17	3-4
	3	4.40	.24	.16	3-4
	4	4.40	.25	.17	3-4
	5	4.43	.26	.17	3-4
72	1				4
	2				4
	3	(No chemical data)			4
	4				4
	5				4
103[5]	1	4.30	0.30	0.20	4
	2	-	-		-
	3	4.35	0.30	0.20	4
	4	-	-		-
	5	-	-		-

[3]0 Reading = fresh green cucumber color; 4 = yellowish-straw color of fresh-pack dills.

[5]Jars were removed from refrigeration 16 times for sampling and photographing during storage period.