



HOSPITALITY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

670 Transfer Road, Suite 21A • Saint Paul, Minnesota 55114 • USA • TEL: (651) 646-7077 • FAX: (651) 646-5984

e-mail: osnyder@hi-tm.com • web site: <http://www.hi-tm.com>

THE MICROBIOLOGY OF FOOD MARKET SALAD AND SALAD BAR ITEMS

Copyright April 1997 by
O. Peter Snyder, Jr., Ph.D.
Hospitality Institute of Technology and Management
670 Transfer Road, Suite 21A
St. Paul, MN 55114

Summary

This past year in the Twin Cities, there have been a number of television news exposés on the microbiological quality of pre-packaged and salad bar salads in food markets. In order to determine the microbial condition salads from various operations in the Minneapolis-St. Paul, Minnesota area, samples of salads were collected from retail food stores in the Twin City area during February and March 1997, and were subjected to a microbial analysis. The only bacteria known to cause foodborne illness that was detected at levels of concern was *Bacillus cereus*. However, this microbial analysis did not determine what percentage of the population of *B. cereus* was pathogenic (Not all strains of *B. cereus* are pathogenic.) It is evident that *B. cereus* is present and is capable of multiplying at normal food market refrigeration temperatures.

The data indicate that the older the product (salad), the higher the microbial count. If pathogenic bacteria such as *Aeromonas hydrophila*, *Yersinia enterocolitica*, or *Listeria monocytogenes*, which begin to multiply at 29.3°F, were present, these pathogens could grow at the temperatures at which the salads were displayed and held, and could become a potential problem. Finding these organisms, because they only sporadically contaminate food, will require extensive testing of a sufficiently large sample.

If you have any suggestions as to how to deal with the salad time-temperature problem so that salads sold in supermarkets and other retail food operations are fresher (not as old), I would be most interested in your comments.

(data table – next page)

Food Market Salad Bar Item Microbial Contamination (CFU/gram)

Source	Salad Type	APC	Coliform	<i>E. coli</i>	Lactics	Mold	Yeast	<i>Bacillus cereus</i>	<i>Listeria monocyt.</i>	<i>Staph. (Coag)+</i>	<i>Salmonella</i>
Store A	Salad*	16,000,000	320,000	<10	60	230	8,700	39,000	NA	NA	NA
Store A	Salad*	9,500,000	93,000	<10	10,000,000	20	110,000	28,000	NA	NA	NA
Store A	Salad*	35,000,000	3,400	<10	4,500	<10	12,000,000	220,000	NA	NA	NA
Store A	Salad*	650,000	160,000	<10	2,500	<10	22,000	31,000	NA	NA	NA
Store A	Salad*	25,000,000	22,000	<10	50,000	400	500,000	48,000	NA	NA	NA
Store A	Salad*	12,000,000	2,000	<10	4,300	700	60,000	300,000	NA	NA	NA
Store A	Ingred.**	150,000	7,400	<10	1,000	<10	140	<100	NA	NA	NA
Store B	Ingred.**	390,000	10	<10	110	30	190	1,000	NA	NA	NA
Store C	Pkgd.	61,000	50	<10	1,100	100	900	<100	neg/25g	NA	NA
Nat'l brand 1	Pkgd.	7,800,000	240,000	<10	1,000	<10	300	<100	neg/25g	NA	NA
Conven. store	Pkgd.	6,700,000	11,000	<10	370,000	400	84,000	<100	neg/25g	NA	NA
Store D	Pkgd.	5,600,000	80,000	<10	2,800	200	2,000	<100	neg/25g	NA	NA
Store B	Pkgd.	220,000	6,000	<10	4,200	200	22,000	<100	neg/25g	NA	NA
Nat'l brand 2	Pkgd.	17,000,000	40,000	<10	77,000	300	40,000	150,000	neg/25g	NA	NA
Store E	Pkgd.	16,000,000	6,000	<10	NA	NA	NA	<100	neg/25g	<10	neg/25g
Store A	Pkgd.	45,000,000	30,000	<10	NA	NA	NA	<100	neg/25g	<10	neg/25g
Store A	Pkgd.	280,000,000	>560,000	<10	NA	NA	NA	<100	neg/25g	<10	neg/25g
Store F	Pkgd.	10,000,000	180,000	<10	NA	NA	NA	<100	neg/25g	<10	neg/25g
Organic food store	Pkgd.	19,000,000	28,000	<10	NA	NA	NA	<100	neg/25g	<10	neg/25g
Nat'l brand 1	Pkgd.	55,000,000	>560,000	<10	NA	NA	NA	<100	neg/25g	<10	neg/25g
Nat'l brand pasta salad	Pkgd.	700,000	5,000	<10	NA	NA	NA	<100	neg/25g	<10	neg/25g

*Salad contained lettuce, broccoli, cucumber, cauliflower, tomato, and onion from a salad bar.

**Ingredients obtained from produce department.

NA = not analyzed