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METHOD COMPARISION FOR CLEANING CUTLERY HANDLED IN COMMERCIAL SETTINGS

For

Campus Products, Inc.

The National Food Laboratory, Inc.
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METHOD COMPARISION STUDY FOR CLEANING CUTLERY HANDLDED IN COMMERCIAL SETTINGS

Background:

Campus Products Inc. has requested the assistance of The NFL in performing a study to evaluate two different methods for handling cutlery in a commercial setting. One method will follow the FDA protocol, and the other method will involve using the Silvershine CDM12K from Campus Products Inc. The FDA guidelines for handling cutlery in a foodservice environment states the cutlery should be washed in a dishwasher and then air dried. Once air dried the cutlery can only be handled by a clean dry cloth. The Silvershine CDM12K from Campus Products Inc. both dries and polishes the cutlery. The wet cutlery is taken from the dishwasher and placed in the Silvershine CDM12K where it is vibrated through a warm granulate, passed under a UV lamp and then exits the unit dry and polished.

Objectives:

To determine if using the Silvershine CDM12K has any effect (positive or negative) on the possible bacteria levels on cutlery versus the current protocol mandated by the FDA.

Materials & Methods:

Organism: The organism used in this study was *E. coli* ATCC #11229. The culture was grown in Brain Heart Infusion broth (BHI) and incubated at 35°C for 18 hours. The 18 hour culture was poured into a container to allow for the inoculation of the cutlery. Each day the testing was performed the inoculum was plated. The results from this testing is listed below in table 1.

Table 1: *E. coli* Inoculum Level

Test Date	Inoculum Level
1/3/2007	$1.2x10^8$ cfu/ml
1/4/2007	$1.4x10^8$ cfu/ml

Cutlery Inoculation: For the purpose of this study forks were chosen since they are probably the most commonly used piece of cutlery in restaurants, as well as the fact that cleaning in between the tines on the fork could be difficult. Each Fork was dipped in the container filled with the *E. coli* broth, removed and allowed to air dry for 10 ± 2 minutes. A total of 70 forks were dipped in the *E. coli* bath.

Washing Procedure: Once all forks had been dipped and air dried they were placed in a cutlery rack and placed in a dishwasher. 5 of the forks were not washed and used as positive controls. The dishwasher used in this study was an Insinger GS 302 undercounter unit. This unit has the following NSF working requirements:

* Wash tank temperature	150 ^{o}F
* Final rinse temperature	180 to195 ^{o}F
* Wash cycle time (minimum)	133 seconds
* Rinse cycle time (minimum)	11 seconds
* Total dwell time (minimum)	19 seconds

Enumeration of Organism: After the designated method each fork was swabbed. Serial dilutions were performed and plated. The plates were poured with Violet Red Bile agar (VRB), allowed to dry and then overlaid. These plates were incubated at 35 ^{o}C for 24 hours. After the incubation period the plates were read and recorded. The testing was performed in triplicate. The results from the testing along with the positive control data are listed in Tables 2 through 4.

Discussion:

Of the two methods only the FDA method had recovery of the *E. coli* organism; no organisms were recovered from those samples that went through the Silvershine CDM12K. On the second test for the FDA method *E. coli* was recovered in 27% of the samples. The levels of organisms recovered were much lower than the initial inoculum (average recovery count was 30 cfu/sample). The *E. coli* isolated from the FDA method may have been trapped in the water on the forks after the washing process and then dried on. The forks that went through the Silvershine CDM12K were exposed to additional heat from the warmed granulate and also passed under a UV lamp and this may be the reason no organisms were recovered from this method.

The process of the cutlery being sanitized by the UV light is a significant difference from the current FDA procedure, which does not include any sanitation step. The UV light employed by the Silvershine CDM12K is at a wavelength of 253.7 nm, which has been recommended as the most effective wavelength to have antimicrobial effects. This wavelength is effective against most bacteria, yeasts, and molds.

In addition to the recovery of organisms the other main difference in the two methods was the timing and appearance of the samples that were run through each method. Once the samples had completed the dishwashing the ones designated for the FDA method were individually placed on sterile foil to air dry. This process took about 20 minutes to complete, and once done a majority of the forks had visible water spots on them. If the samples with the water spots were to be hand polished to remove the water spots it would increase the chance of post wash contamination either from the hands of the polisher or from the material used for polishing. The samples run through the Silvershine CDM12K were dried and polished in about 45 seconds after being placed in the unit. There was no water spots observed on these samples. The Silvershine CDM12K has

the ability to dry and polish up to 12,000 pieces per hour; which would be significantly faster than the air drying.

The testing for this study was performed in a lab setting which is probably much cleaner than the average kitchen area of a restaurant. Also we would assume that the volume of 70 pieces of cutlery that we washed in each cycle is much lower than what would occur in a restaurant. The dirtiness of a restaurant kitchen along with an increased volume of cutlery per wash cycle would increase the likelihood that some of the items may not get properly cleaned.

From the testing that was performed we believe that the Silvershine CDM12K would be a beneficial addition to foodservice businesses as it is more effective and efficient than the methods that are currently in use.

Table 2: FDA Method

	Test #1 (cfu/sample)	Test #2 (cfu/sample)	Test #3 (cfu/sample)
Sample #	<10	<10	<10
Sample #1	<10	20	<10
Sample #2	<10	<10	<10
Sample #3	<10	<10	<10
Sample #4	<10	20	<10
Sample #5	<10	<10	<10
Sample #6	<10	<10	<10
Sample #7	<10	<10	<10
Sample #8	<10	10	<10
Sample #9	<10	<10	<10
Sample #10	<10	20	<10
Sample #11	<10	<10	<10
Sample #12	<10	<10	<10
Sample #13	<10	<10	<10
Sample #14	<10	<10	<10
Sample #15	<10	<10	<10
Sample #16	<10	80	<10
Sample #17	<10	60	<10
Sample #18	<10	<10	<10
Sample #19	<10	<10	<10
Sample #20	<10	10	<10
Sample #21	<10	<10	<10
Sample #22	<10	<10	<10
Sample #23	<10	<10	<10
Sample #24	<10	<10	<10
Sample #25	<10	<10	<10
Sample #26	<10	20	<10
Sample #27	<10	<10	<10
Sample #28	<10	<10	<10
Sample #29	<10	<10	<10
Sample #30	<10	<10	<10

Table 3: Silvershine CDM12K Method

	Test #1 (cfu/sample)	Test #2 (cfu/sample)	Test #3 (cfu/sample)
Sample #1	<10	<10	<10
Sample #2	<10	<10	<10
Sample #3	<10	<10	<10
Sample #4	<10	<10	<10
Sample #5	<10	<10	<10
Sample #6	<10	<10	<10
Sample #7	<10	<10	<10
Sample #8	<10	<10	<10
Sample #9	<10	<10	<10
Sample #10	<10	<10	<10
Sample #11	<10	<10	<10
Sample #12	<10	<10	<10
Sample #13	<10	<10	<10
Sample #14	<10	<10	<10
Sample #15	<10	<10	<10
Sample #16	<10	<10	<10
Sample #17	<10	<10	<10
Sample #18	<10	<10	<10
Sample #19	<10	<10	<10
Sample #20	<10	<10	<10
Sample #21	<10	<10	<10
Sample #22	<10	<10	<10
Sample #23	<10	<10	<10
Sample #24	<10	<10	<10
Sample #25	<10	<10	<10
Sample #26	<10	<10	<10
Sample #27	<10	<10	<10
Sample #28	<10	<10	<10
Sample #29	<10	<10	<10
Sample #30	<10	<10	<10

Table 3: Positive Control Data

	Tested 1/3/07 (cfu/sample)	Tested 1/4/07 (cfu/sample)
Positive Control #1	$2.0x10^6$	$6.2x10^6$
Positive Control #2	$2.4x10^6$	$1.5x10^7$
Positive Control #3	$1.8x10^5$	$1.6x10^7$
Positive Control #4	$3.2x10^6$	$8.6x10^6$
Positive Control #5	$3.5x10^6$	$6.6x10^6$