

DISPOSABLES VERSUS REUSABLES:

A study of Comparative Sanitary Quality

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Do disposable cups, plates and other single-use food service utensils actually enjoy the sanitary quality that is claimed for them? A recent comparative study produced these findings:

- The total plate count microorganism levels for reusable food service items was consistently higher than for disposable items sampled in this study.
- The percentage of reusable samples with delectable microorganisms was approximately two times that of disposable items.
- Disposable have less potential for bacterial contamination probably because of reduced handling frequency. The findings from test alies in the Ann Arbor, Michigan area correlated closely with the results of a similar study conducted seven years earlier in Syracuse, New York.

One of the key claims made for disposable food service items by the single service industry is their superior sanitary quality. The makers of paper and plastic cups, plates, bowls and other disposable food service utensils emphasize the public health value along with the convenience of their products, and point to widespread acceptance of disposables among public health professionals.

The line of reasoning proceeds as follows: Since disposables are used only once by one person, then discarded, they are inherently less likely than reusable utensils to be contaminated by bacteria and thus less likely to contribute to the transmittal of disease.

But what is the reality? To what extent are disposables actually less contaminated by bacteria

relative to reusable? This question was the subject of a recent study sponsored by the Single Service Institute (SSSSI), the national trade association of the disposables industry. The final report, prepared by an independent laboratory under the guidance of the authors, is entitled "Comparison of Microbiological Contamination of Disposable and Reusable Food Service Items in Their Intended Use Environment". In objective, protocol and results, the study closely parallels a similar study conducted in 1976 in the Syracuse, New York area.

The earlier study revealed that in comparative tests in a variety of food service establishments in and around the city of Syracuse, the average bacterial counts of disposable food service items were significantly lower than those of reusable items. Further, in the specific bacteria categories of staphylococcus and chloroform, disposable had significantly lower bacterial counts than corresponding reusable items.

During the earlier study, originally designed a pilot project, consideration was given to replicating the test efforts at other food service sites in geographic locations other than Syracuse. The Syracuse results were so clear and consistent, however, that it was deemed unnecessary at that time to carry the studies further into other areas.

CORRELATION OF TWO STUDIES

Seven years later, the Single Service Institute decided to run another comparative study in another part of the country to test out once more the relative sanitary quality of disposable versus reusable utensils and to see whether the new figures from a study conducted in Michigan held to the pattern of contamination differences recorded in the earlier Syracuse study.

Two key findings emerged from the correlation of the two efforts:

1. Confirming the Syracuse study, the results of the Ann Arbor study indicated a statically significant difference between the sanitary quality of disposable and reusable food service items as measured by the frequency of occurrence of organisms on items and

number of organisms detected per food service item (statistical significance established at the 95 percent confidence level).

2. The correlation of the two studies indicates that although they were independent, the results from both studies are estimates of the same population (i.e., the same results would be expected from samples collected at other locations).

From these correlations, it would be expected that just as the Ann Arbor study validated the Syracuse findings with respect to the sanitary quality of disposables, any further studies of disposables versus reusables in other parts of the country would consistently produce similar results.

SUMMARY OF THE ANN ARBOR FINDINGS

The results of the new study can be summarized as follows:

- The total plate count microorganism levels for reusable food service items was consistently higher than for disposable items sampled in this study.
- The percentage of reusable samples with detectable microorganisms was approximately two times that of disposable items.
- Disposables have less potential for bacterial contamination, probably because of reduced handling frequency.

The study findings emphasize the importance of good sanitary practices whether disposables or reusables are employed. Storage in a clean area, proper storage procedures and minimum handling are singled out as essential. Where reusable were is used, proper dishwashing procedures should be strictly followed.

STUDY PROCEDURES/PARAMETERS

The study protocol was designed to compare the microbiological results obtained from swabbing disposable food service utensils such as plates, cups, bowls, and tumblers, with the results from similar reusable items. From the very beginning, guidance of three public health professionals.

The study sought to measure the sanitary quality of food service items of their point of use, so a survey was made of establishments at their point of use, so a survey was made of establishments in the Ann Arbor area to determine what types of utensils were being used and to select sites with the desired mix of food service items. Altogether, 15 sites were chosen three each of the following kinds of establishment: motels, hotels, hotel bars, hospitals, and nursing homes.

Utensil samples were collected at times of day representatives of actual use and were selected from as close to the point of use as possible.

For each motel, 25 disposables tumblers were randomly sampled from available rooms, while for each hotel 25 reusable glasses were taken for immediate swabbing.

In each hotel bar, 25 reusable glasses were randomly selected and swabbed. A mix of wine, beer, mixed drink and water glasses was chosen either from and overhead rack or from shelving in the Immediate bar area.

In all three-hospital settings, an equal number of disposable and reusable samples were tested just before the noon meal. In two hospitals, samples were chosen from both patient food service arrears and the main cafeterias. In the third hospital, there was a kitchen but no cafeteria.

In two of the three nursing homes, an equal number of disposable and reusable items were tested. In the third home, available samples were chosen from a limited supply of disposables.

REVIEW OF TEST RESULTS

The data from the study are illuminating both in themselves and in comparison with the results of the earlier Syracuse study. As already noted the values from both studies correlate well, although the two studies were independent and are significant at the 95 percent confidence level.

Table 1. Comparison of mean bacterial counts for disposable and reusable food service items from studies (organisms per item).

	Disposables		Reusables	
	Ann Arbor Study (1983)	Study (1976)	Ann Arbor Study (1883)	Syracuse Study (1876)
Total Plate				
Count	6.8	17.6	231.5	274.9
Staphylococcus	0.3	0.5	0.9	13.3
Streptococcus	0	0.2	2.5	10.6
E.Coll	0	0	0	0.8

Table 1 shows the mean values of the bacterial counts (number of organisms per item) for both disposable and reusable utensils, as recorded in the Ann Arbor study and the earlier Syracuse study as well. The difference in counts between disposables and reusables underscores a potential for more contamination on reusable food service items.

Figure 1 presents the data on total plate count differences between disposables and reusables in another and revealing way. This depicts the range, median and inner quartile range (middle 50 percent of data) for all

disposable and reusable samples. The range of total microorganisms on disposables is seen to be from less than one to 207 organisms per food service item, while for reusables the range is from less than one to 18,000 organisms. While the median value for disposables was non-detectable, for reusable it was 6.5 organisms per item. The middle 50 percent of the data for disposables ranged from non-detectable to three organisms per item: for reusables the range was from two to 22 organisms.

The data suggest that the most logical reasons for the larger number of organisms found on reusable versus disposable food service items are increased handling, improper cleaning and/or storage and poor handling procedures.

APPLYING THE “100 MICROORGANISM” STANDARD

The report further relates the study results to the standard of 100 total microorganisms per utensil surface recommended in 1950 as a minimum requirement for effective machine dishwashing by the Committee on Sanitary Engineering & Environment of the National Research Council.

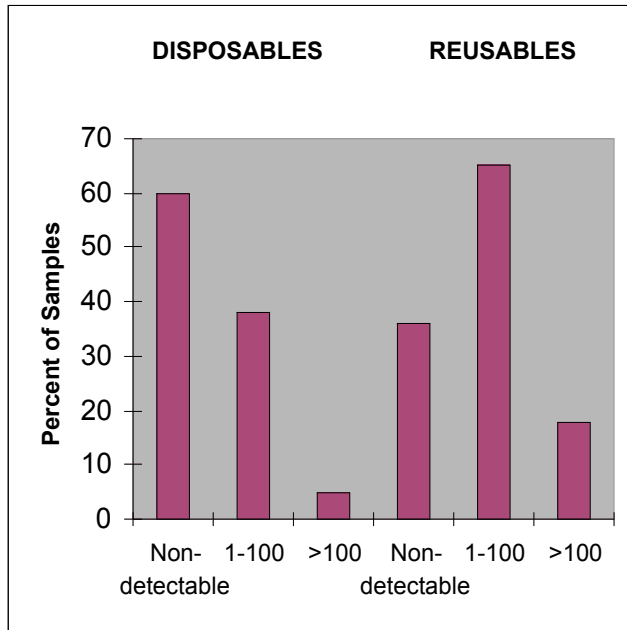


Figure 2. Percent of all samples with measured total plate count organisms levels of non-detectable, 1-100, and greater than 100 organisms per item by samples type.

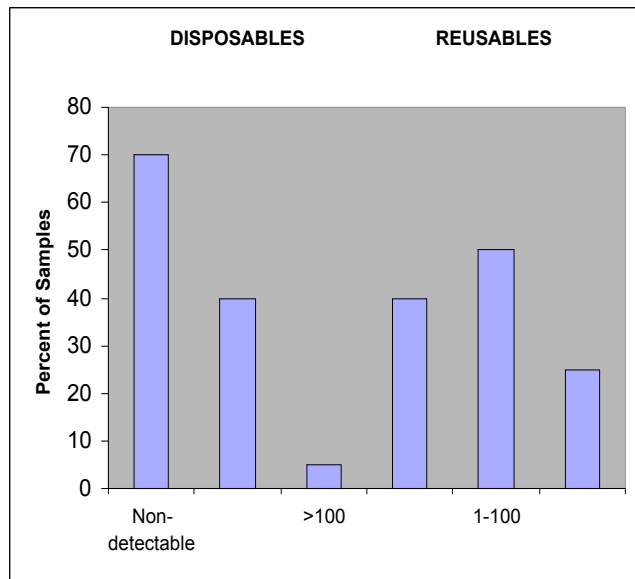


Figure 3. Percent of samples from a previous with measured total plate count organisms levels of non-detectable, 1-100 and greater than 100 organisms per item by sample type.

Figure 2 compares disposables and reusables in terms of three different levels of total plate

count organisms: non-detectable (less than one), from one to 100, and greater than 100 organisms. The figure shows that for reusables, 13percent of all samples had counts above 100-the minimum level prescribed for dishwashing. For disposables this number was only two percent. The highest percent occurrence for disposables was non-detectable, but for reusables was between one and 100 microorganisms. Figure 3 shows a similar comparison taken from the 1978 Syracuse study, revealing a pattern very close to the one that emerge from the 1983 Ann Arbor study.

The three hotel bars sampled in the study used reusables exclusively. The results showed a mean total plate count for bar glasses of 1580.9 organisms, with a frequency of occurrence of 93.3 percent – far higher readings than the average for all reusables. This can be explained by the fact that sanitation practices in bars are frequently affected by peak volume business, during which time washing, rinsing, and drying operations are not likely to be well controlled. Figure 4 shows how bar glasses fared in terms of the 100-organism standard set for dishwashing effectiveness.

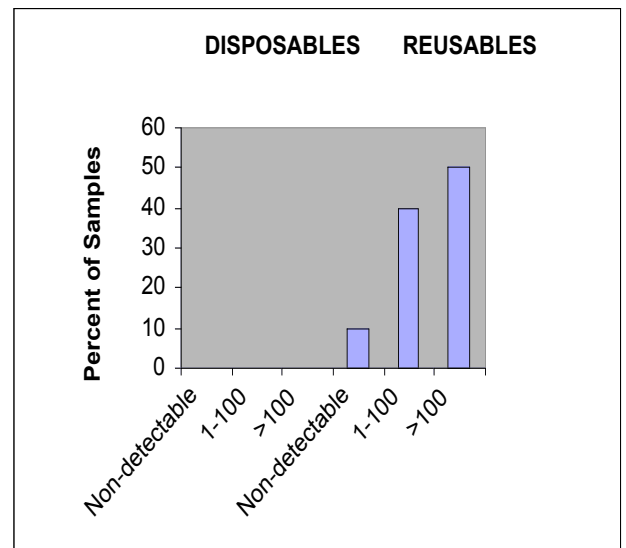


Figure 4. Percent of bar glass samples with measured total plate count organism levels of non-detectable, 1-100 and greater than 100 organisms per item by sample type.

FINAL THOUGHTS

The study protocol did not call for a thorough probe for the health implications of the comparative sanitary quality of disposable and reusable food service items. For this a correlation of the occurrence of total bacteria counts and incidence of acute disease would be necessary. But the data surely are suggestive of significant health implications, as a key premise in public health practice is that more bacteria present, the greater the likelihood of potential health hazards and greater the possibility of disease.