



# EVALUATION OF AN IUL FLASH & GO AUTOMATED COLONY COUNTER

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## ABSTRACT

An IUL Flash & Go automated colony counter was used to enumerate *E. coli* ATCC 700728 colonies, and its performance was compared with manual counting on spiral plates. Linear regression analysis and the log differences between the manual and automated counts were determined. The results were analyzed to evaluate the reliability and accuracy of the colony counter. A correlation coefficient of 0.971, a slope of 0.9445 and intercept of 0.207 all indicate a strong, linear relationship. The mean log value difference between the manual and Flash & Go count methods was -0.029. Of the 72 plates counted, 90% of the plates were within 0.1 log<sub>10</sub> difference between the manual and Flash & Go automated counts. These results demonstrated that the Flash & Go automated colony counter is an effective, accurate and time saving alternative to the standard method of manual counting.

## INTRODUCTION

Counting of microbial populations in food is a standard procedure of testing food contamination in a food microbiology laboratory. Manual counting of colony-forming units (cfu), grown on Petri plates containing growth media is one of the most tedious, laborious, and time-consuming processes in a laboratory (Putman et al., 2005; Garry et al., 2006). Recently, several types of automated colony counters have been developed to improve efficiency in colony counting. However, there are very few published comparisons between automated and manual counting methods (Fotheringham, 2006). Reliability and accuracy are the crucial parameters to be considered in case of an automated colony counter (Marotz et al., 2001). Automated counting systems are generally acceptable if the automated counts are within 0.5 log<sub>10</sub> of the manual count (Garry et al., 2006). In this study, an IUL Flash & Go automated colony counter was used to enumerate *E. coli* ATCC 700728 colonies and its performance was compared with manual counting on spiral plates.

## OBJECTIVE

To evaluate the performance of the IUL Flash & Go automated colony counter versus the manual hand-count method on spiral plates.

## MATERIALS AND METHODS

- The samples used were beef inoculated with *E. coli* ATCC 700728.
- Samples were treated with low voltage electrical current in the presence of NaCl solution (various current intensities and treatment duration).
- Meat sample along with saline solution was stomached and filtered.
- An automated spiral spreader (Eddy Jet, Fig. 1) was used to spread 50 µL of solution on Nutrient agar plates.
- Inverted plates were incubated at 37 °C for 24 h.
- An IUL Flash & Go (Neutec) automated colony counter was used to enumerate colonies.
- One member of staff then counted the true number of colonies on the same plates using a manual counter (Bantex).

### Data Handling Method

- A total of 72 plates were randomly selected from the low voltage current experiments.
- Any plate with a total count less than 20 or greater than 300 were excluded from further analysis (Fotheringham, 2006; Garry et al., 2006).
- The base 10 logarithms of these colony counts were used for statistical analysis.
- The results of the manual count were correlated with the results from the Flash & Go count.
- The reproducibility of the values obtained with the Flash & Go counter was determined by inserting the same agar plate 20 times without rotation (Wilson, 1995). Values ranging from 10<sup>2</sup> to 10<sup>5</sup> cfu/mL were evaluated.
- Linear regression analysis and the log differences between the manual and automated counts were examined using SAS and Excel.

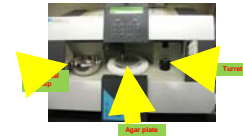


Fig. 1. Eddy Jet spiral spreader.



Fig. 2. IUL Flash & Go automated colony counter.



Fig. 3. Image of *E. coli* colonies on Nutrient agar plates produced using the Flash & Go system.

## RESULTS AND DISCUSSION

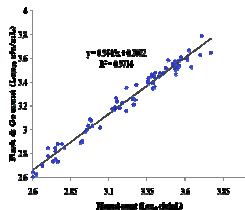


Fig. 4. Linear trend line analysis of data comparing manual and Flash & Go counts.

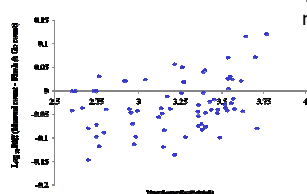


Fig. 5. Performance limits demonstrating the mean log value differences between the manual and Flash & Go counts.

Table 1. Reproducibility of Flash & Go at a range of bacterial concentrations.

Mean log count, cfu/ML	Standard deviation	Variance
2.81	0.02143	0.00046
3.43	0.00482	0.00002
4.95	0.01095	0.00012
5.27	0.06320	0.00399

- Automated counting and manual counting methods had a linear relationship with a correlation coefficient of 0.97.
- Of the 72 plates counted, 90% of the plates were within 0.1 log<sub>10</sub> difference between manual and Flash & Go counts.

- The standard deviations (SD) obtained for repeatedly counted plates were low. The mean SD for the Flash & Go for values ranging from 10<sup>2</sup> to 10<sup>5</sup> cfu/mL was 0.025. The variance was less than 0.0039.
- The mean log value difference between the manual and Flash & Go was -0.029.

## CONCLUSIONS

- The IUL Flash & Go automated colony counter is a suitable alternative to the standard method of manual counting.
- The use of automated colony counter increased the overall efficiency in our research operations by significantly reducing the time devoted to conventional manual plate count and made our tasks easier for data manipulation, analysis and interpretation.

## LITERATURE CITED

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