



# Handy Helper

Application Note #03

## ProtoCOL the Essential Tool for Microbial Quality Control *A Rapid Method of Identifying Contaminated Foods*

### Introduction

Many microbial QC departments have a small team of people and yet are faced with the prospect of having to examine thousands of food samples every year for common contaminants such as Salmonella, *E.coli* 0157, *Bacillus cereus*, *Listeria monocytogenes* and Campylobacter. The majority of these samples prove negative with around 99.9 per cent being pathogen free. However, in a food poisoning outbreak a QC department has to test a large number of samples very quickly to help pinpoint the source of contamination. This is to ensure that those infected can be given the most effective treatment and the offending food can be withdrawn from sale to prevent further cases occurring.

The need to be able to process a comprehensive range of potentially contaminated samples quickly as well as continue routine testing means QC departments have a growing problem with sufficient staff resources. For example using a manual light box and pen method, colony counting can take several minutes per plate. In addition because this produces no electronic record of the plate or count, users have to manually enter plate counts into a computer, which can lead to keying errors and therefore inaccurate results. Automating this labour intensive part of the process can alleviate the sample bottleneck.

### Total Viable Counts – Automated Method

An alternative to manually enumerating colonies on spiral or serial dilution plates is the Symbiosis ProtoCOL automated colony counter. The system (Figure 1) combines a camera integrated with software, which analyses and automatically allows for plate and sample variations. Its software is flexible enough to compensate for different coloured media and agar thickness as well as artefacts such as bubbles or debris. It can even enumerate touching colonies and colonies of different sizes.

ProtoCOL analyses plates in accordance with published methods and automatically transfers the results to computer, thus preventing transcription errors. It can also present the results in a GLP compliant report format.

Figure 1: ProtoCOL colony counting system



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For many QC departments, ProtoCOL offers the biggest increases in sample throughput because it automates a vital part of the detection process. Each plate is read and analysed in a couple of seconds and allows microbiologists to read around 100 plates in the time it used to take to read one.

#### Use of ProtoCOL in a Real Food Poisoning Outbreak

The time saving that ProtoCOL offers a microbiology QC department is not only useful for routine work but is invaluable in an emergency situation such as assisting in tracing the source of a food poisoning outbreak.

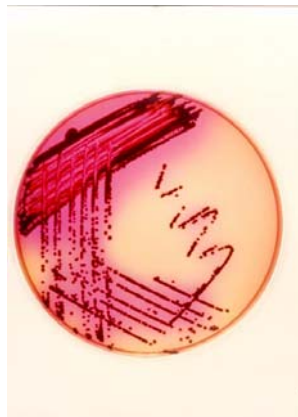
A good example of this occurred during a recent national outbreak of food poisoning in Scotland. 36 people presented with symptoms of nausea, vomiting and fever after eating food contaminated with *Salmonella enteritidis*.

*Salmonella enteritidis* has a one per cent fatality rate affecting mainly the elderly, infants, and those who are immuno-compromised. Therefore, for such people at risk, it was imperative that the source of the *Salmonella enteritidis* infection was quickly identified.

The FSA (Food Standards Agency) set up an outbreak control team, which included the Microbiology Department at the Western General Hospital in Edinburgh. Initial investigation showed that a number of those infected had eaten at three Chinese restaurants and so the FSA gathered over 50 food samples from these three sites.

The food samples were sent to the Western General Hospital for testing where staff spiral plated them onto plate count agar and incubated them at 37°C for 24 hours. Simultaneously, they placed samples into peptone water and incubated them for 48 hours at 37°C. The peptone water was streaked onto XLD (Xylose Lysine Desoxycholate) agar (Oxoid, Basingstoke, UK) to test for *Salmonella* (Figure 2).

Figure 2: XLD media showing *Salmonella* colonies as red with black centres (courtesy of Oxoid)



The ProtoCOL system was used to count the spiral plates and produced total viable count results for all of the samples in just over 15 minutes, a task which would have taken 25 hours manually. Food samples that contained between  $10^4$ - $10^5$  viable bacteria per gram of food were noted as potential suspects. The XLD plates were then used as the confirmatory test of which samples contained *Salmonella*. The *Salmonellas* were taken from XLD plates and subjected to additional investigation, including biochemical and antisera tests to confirm which was *Salmonella enteritidis*. All of this work eventually narrowed down the source of contamination to chicken in a sauce supplied to restaurants by a local retailer. The chicken was withdrawn from sale, the retailer was placed under investigation and there were no further cases of this type of *Salmonella enteritidis* reported.

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## Conclusions

With as much as ten per cent of the food consumed across Europe being contaminated with potentially harmful bacteria, many microbiology QC departments must have the capacity to cope with the increase in sample throughput caused by an unexpected food poisoning crisis.

Using a Synbiosis ProtoCOL automated colony counter any QC department can quickly and easily process large numbers of routine quality assurance tests in minutes instead of days. In addition, a ProtoCOL can provide QC departments with the capacity to handle extra food samples and can also help free up valuable time for microbiologists to carry out the specialist tests necessary to rapidly locate the source of a food poisoning outbreak.