

PULSIFIER® A New Generation of Sample Processing Instrument

Ever since it became necessary to evaluate the microbiological content of foodstuffs, microbiologists have found it necessary to grind, chop or otherwise disrupt the food matrix to release organisms. These methods range from Pestle and Mortar through to Waring and paddle-type blenders. Hard foods i.e. grain and those containing bones, shell etc. are not handled well by mechanical type blenders. The resulting suspensions contain particles of many sizes and different constituencies making the extraction process difficult to control. Paddle-type blenders have the benefit of enclosing the sample in a bag. However hard particles are responsible for many bag failures and increased analysis time not to say increased work for the analyst in cleaning up. It is also true to say that in any analytical process the better prepared a sample is the more likely it is that an accurate result will be obtained.

Each of these methods results in major disruption to, and destruction of the food matrix

under test. This process can interfere both physically and

incorporating a filter that effectively allows the



chemically with the test due to the presence of large particles and/or release of compounds that may interfere with the test. The physical interference can result in test units being almost impossible to pipette or filter thus reducing the effectiveness of the test. The current BAM method makes no recommendations should it not be possible to pipette samples that have been blended. Users of paddle type blenders have long been able to use plastic bags

supernatant to be pipetted without being blocked by food particles. Chemical interference can take place by the release of growth inhibiting compounds; compounds that can interfere with immunological reactions and compounds that can interfere with or inhibit molecular methods. The release of amplification inhibitors will become very important as molecular methods become more accepted in routine laboratories.

Certain analytical methods also have a requirement for as clean a sample as possible. Petrifilm® (3M Co, St. Paul, MN) where a sample is pipetted onto an agar layer, ISO-GRID® HGMF (QA Life Sciences, San Diego, CA) where the sample is filtered through a membrane and SimPlate® (Biocontrol Inc., Bellevue, WA) where the sample is added to a special unit that allows counting. All need samples that contain as few particles or "lumps" as possible. The clarity of the sample and equivalence in bacterial count has been well documented

(1). Where automated systems for the inoculation of conventional pour plates are used e.g. Whitley Automatic Spiral Plater (Don Whitley Scientific, Nottingham, UK), a filtered sample has to be used to avoid the dispensing stylus becoming clogged with food particles. Hence the increasing use of sterile bags that contain a filter. It was also noted by Sharpe et al (Reference 1) that impedance methods and dye reduction tests on meat benefited from the reduced debris.

Unless the foodstuff has been previously processed e.g. ground meat, or is of the dairy variety, bacterial contamination is most likely to be on the surface of the material. Plant materials that have been sprayed with silage or organic fertilisers are also likely to be contaminated with bacteria. Fresh meat may also be surface contaminated by gut contents at the point of slaughter. Destruction or disruption of the food matrix to get at contaminants is not necessary and is undesirable.

Paddle type blenders first became available over twenty years ago and since that time sample preparation techniques have remained fairly static. There have been modifications to bags and instruments but the basic principle has stayed the same. Microgen Bioproducts has released the next generation of sample preparation instrument called Pulsifier™. The principle is completely different from existing instruments and offers solutions to all the problems outlined previously. Samples are weighed out with diluent into a bag in the normal way but then the bag is placed inside a vibrating ring (Figure 1).



Figure 1. Pulsifier® showing the beating ring

As the ring hits the bag, the force is translated into shock waves that are transmitted through the liquid. As the bag is a closed system, the shock waves tumble the particles about in the liquid. This results in two actions; bacteria are removed from the food particles by a washing action not dissimilar to a washing machine, but also by the shock wave essentially knocking the bacteria from the surface. "Stomachate and "to stomach" have passed into general usage over the years. For convenience the terms "Pulsificate" and "to pulsify"

have been adopted. The pulsificate is relatively clear and any large particles, depending on the sample, quickly settle out enabling easy transfer of the sample for further work (Figure 2). In this way even soft foods such as mushrooms (Figure 3) maintain their integrity.



Figure 2. "Pulsified" prawns.

Harder foods such as carrots (Figure 4) can also be pulsified with good results.

At the other end of the scale materials as diverse as grain and chicken feet are also handled well by the instrument. Although the instrument has been primarily designed for the preparation of samples for bacteriological analysis, it is possible that it may also be suitable for chemical analysis such as mycotoxins and antibiotics. This is, however yet to be tested.



Figure 3. "Pulsified" mushrooms.

The ability of Pulsifier® to produce bacterial counts

equivalent to paddle type blenders has been validated by a number of workers. Fung et al (2) demonstrated equivalent counts could be achieved with both Pulsifier® and a paddle type blender and also showed that food types not normally able to be blended were handled with ease.



Figure 4. "Pulsified" carrots.

The ability to produce "pulsificates" with little or no debris will offer multiple benefits to any laboratories that are interested in separating contaminating bacteria from both soft and hard food matrices.

In summary benefits of the Pulsifier® include:

- 1) Reduced sample bag failures.
- 2) Cleaner, more easily handled samples.
- 3) Less destruction of food matrices Resulting in reduction of potential inhibitors.
- 4) Equivalent counts to paddle-type blenders.
- 5) Reduced bench space required.
- 6) Easily movable due to light weight.
- 7) Programmable timer.

References:

1. Sharpe A.N., Hearn E.M. and J.Kovacs-Nolan (2000) Comparison of Membrane Filtration Rates and Hydrophobic Grid Membrane Filter Coliform and *Escherichia coli* Counts in Food Suspensions Using Paddle-Type and Pulsifier Sample Preparation Procedures. J. Food. Protection. **63**: 126 – 130.
2. Fung D.Y.C., Sharpe A.N., Hart B.C. and Y.Lui (1998) The Pulsifier®: A New Instrument for Preparing Food Suspensions for Microbiological Analysis J. Rapid. Methods. Automation. Microbiol. **6**: 43 – 49.

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Exhibitions

Catch up with Microgen Bioproducts at the the following events during the year 2002

- June – Institute of Food Technologies Annual Meeting, Anaheim, California, USA
- June – CSL/ JIFSAN Rapid Diagnostic Methods in Food Safety, Central Science Laboratory, York, UK
- September - ASM , Melbourne, Australia
- September – Public Health Laboratory Annual Meeting, Warwick, UK
- November – Medica, Düsseldorf, Germany

FOR MORE INFORMATION ON THE PULSIFIER® OR ANY OF THE OTHER MICROGEN FEATURED, PLEASE CONTACT YOUR LOCAL MICROGEN DISTRIBUTOR OR COMPLETE THE INFORMATION REQUEST FORM ENCLOSED AND RETURN IT TO MICROGEN BIOPRODUCTS LTD, UK.

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