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Samplezyme: A Technological Breakthrough for the Biofilm Sampling on Food Contact Surfaces

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Introduction:

Surface sampling of microorganisms encapsulated in biofilms is little or no effective with current sampling methods.

Purpose:

An enzymatic biofilm hydrolyzing solution (SampleZyme) was developed 1) to make the bacteria accessible to surface sampling and 2) to ensure compatibility with analytical methods used in food microbiology.

Methods:

The efficacy of the enzymatic solution to hydrolyze biofilms was carried out with the microplate model described by Iglesias et al. (2019) and adapted to include other bacterial strains encountered in agri-food industry (*Lactococcus lactis*, *Pseudomonas fluorescens* and *Listeria innocua*). Conventional cleaning solutions (sodium hydroxide (1%), phosphoric acid (1%), chlorinated alkaline detergent (1%)) were compared to SampleZyme. Inside the same plate, all solutions were tested six times and each plate was tested three times.

The compatibility on analytical methods commonly used in food microbiology (bioMérieux VIDAS, Bio-Rad IQ Check, bioMérieux Tempo, selective media, Total flora ISO 4833) was tested with and without the SampleZyme solution on three strains of *Salmonella* spp, *Listeria monocytogenes* and *Escherichia coli* O157. Each test was repeated five times. A total of 1,320 tests were performed.

All the results obtained were analyzed statistically with nonparametric tests (Kruskal-Wallis and Mann-Whitney tests).

Results:

SampleZyme improves the removal of all tested biofilms with a significant difference compared to sodium hydroxide (n=102; p-

value<0.05), phosphoric acid (n=98; p-value<0.05) chlorinated alkaline detergent (n=102; p-value<0.05). SampleZyme was the most effective to remove biofilms with an average reduction of 97% (n=46). The other solutions are less or not at all effective.

No statistical difference is observed on the results of the analytical methods with and without SampleZyme on *Salmonella* spp (n=330; p-value>0.05), *Listeria monocytognes* (n=330; p-value>0.05), and *Escherichia coli* O157 (n=330; p-value>0.05).

Significance:

SampleZyme is new tool to improve biofilm sampling on surfaces to assess the microbial quality and safety in the environment of agri-food industries.

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