Phages for active food packaging: preliminary results in food

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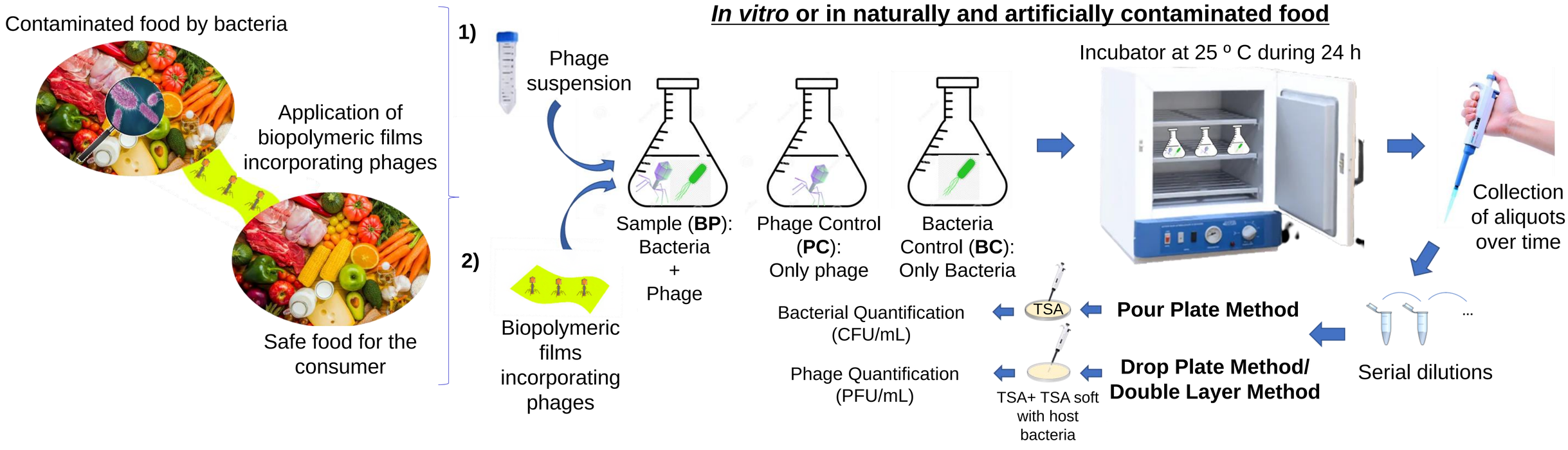
Introduction

- The recurrent use of antibiotics, including in animal production, significantly increases the appearance of multiresistant bacterial strains, resistant to antibiotics commonly used[1];
- These bacteria are responsible for foodborne illnesses which are a serious social problem;
- Alternatives are needed to overcome this problem, namely in food industry, where an effective bacterial control is crucial to public health;
- Phages, viruses that only infect bacteria[2], can be a suitable approach to inactivate bacteria, with promising results and producing fewer resistant mutants than the common antibiotics[3,4];
- In order to protect phages from environmental challenges and improve its efficacy, allowing slower and continuous release, the incorporation of phages in food packaging can be a more effective alternative.

Aim

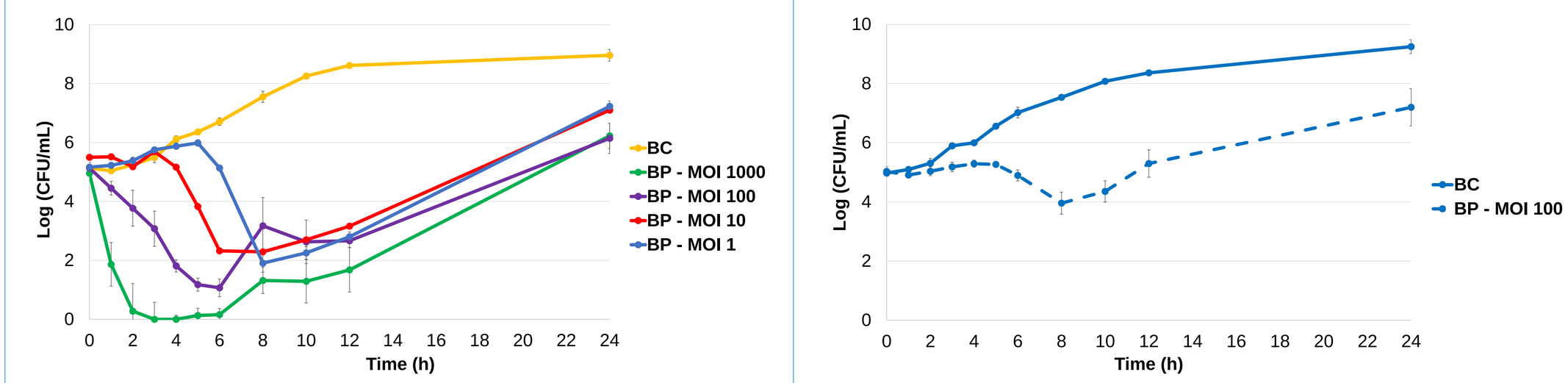
Establish a safe and effective protocol by producing new antibacterial biopolymeric films incorporating phages for active food packaging in order to inactivate dangerous food pathogens and to improve food security.

Methods



Results

Escherichia coli + Phage T4



MOI (Multiplicity of Infection) - ratio between the number of phages and the number of bacterial cells.

Conclusions

- Phage T4 was effective to inactivate *E. coli* in TSB and in milk;
- *In vitro*, for all values of MOI, a bacterial inactivation of about 6 Log (CFU/mL) was obtained, differing only the time at which the maximum inactivation occurs with the MOI;
- In milk, a more complex matrix, a maximum inactivation of about 4 Log (CFU/mL) was obtained;
- Although more assays with different bacteria and phages and with the biopolymeric films in food must be done, **phage treatment seems to be a promising approach for the inactivation of food pathogens in order to improve food security.**

References: **1.** Tang, K. L. *et al. Lancet Planet Health* 2017, 1, 316–327; **2.** Clokie, M. R. J. *et al. Bacteriophage* 2011, 1(1), 31–45; **3.** Altamirano, F. L. G., & Barr, J. J. *Clinical Microbiology Reviews 2019,* 32(2), 1–25. **4.** Principi, N. *et al. Frontiers in Pharmacology* 2019, 10(513), 1–9.

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