SYNERGISTIC EFFECT OF PHAGES AND ORGANIC ACID SALTS ON LISTERIA CONTAMINATED READY TO EAT TURKEY HAM

RMC 2018 RECIPROCAL MEAT CONFERENCE

phageguard

Poster #118

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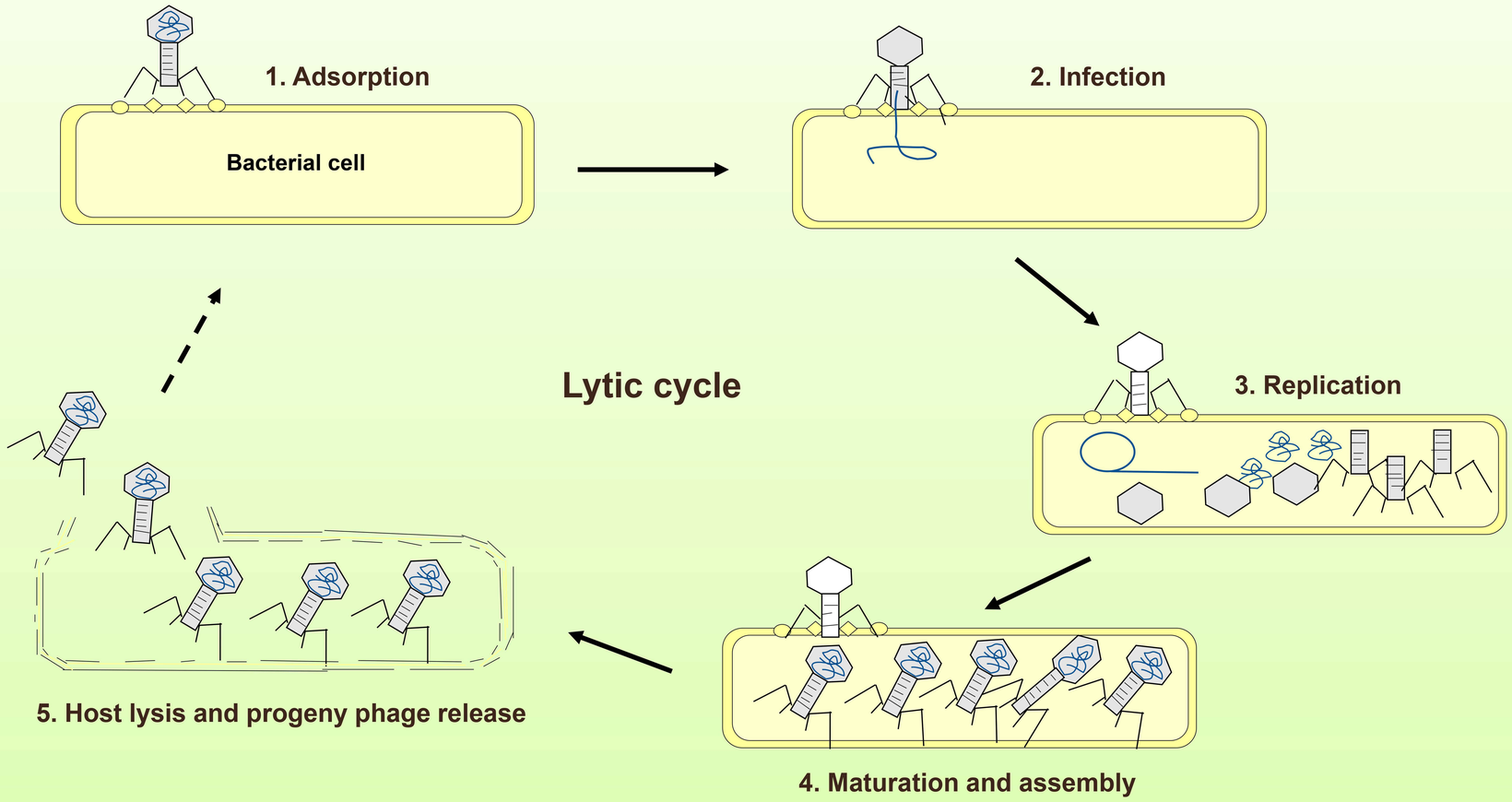

Figure 1. Infection cycle of a bacteriophage. (1) After adsorption to specific receptors on the baterial host the phage (2) injects its genomic DNA into the host cell. (3) The genomic DNA starts replicating and phage components are synthesized. (4) Phages are assembled after which (5) the bacterial host lysis.

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Efficacy of a two-phage cocktail in reducing *Salmonella* in poultry – laboratory and field trial data

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Introduction

Salmonella remains an issue in the poultry industry and a multi-hurdle approach is taken to reduce prevalence in final product. Phages as the natural enemy of bacteria can be used as an additional hurdle. The two phages used in this study both have extremely broad host ranges and can infect all serovars of *Salmonella*. One can assume phage-dose dependant response and this was tested. Furthermore field trials were performed in 3 different locations with 3 different manufacturers.

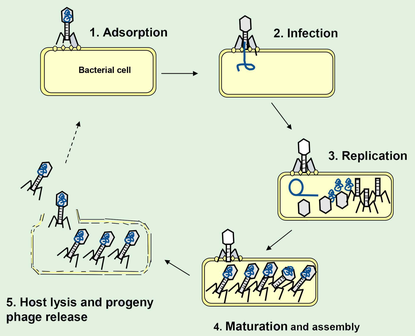

Fig. 1 Life cycle of strictly lytic phages

Ojective

To determine efficacy of the commercially available phage product PhageGuard S against Salmonella on poultry under laboratory conditions and on naturally contaminated meat.

Methods

Chicken breast was contaminated at levels of ~10^4 CFU/g S. Enteritidis Se13. After attachment of the cells for 30 min the breasts were treated with either 2 x10^6 or 2 x10^8 PFU/cm^2 (plaque forming units). Cells were retrieved after 1,2 and 6 days and plated on XLD medium. The killing efficacy on different strains was subsequently tested by including a *S.* Heidelberg and S. Typhimurium strain at an intermediate dose. All experiments were repeated twice. For the industrial trials the selected cuts were treated at a similar dose and presence/absence testing was performed using varying USDA approved protocols. Tests were performed twice with offline product allowing direct comparison with non treated product. The following products were investigated: chicken livers, necks, breasts and turkey backs were tested . Statistical analysis was performed using Fischers' exact test.

Results

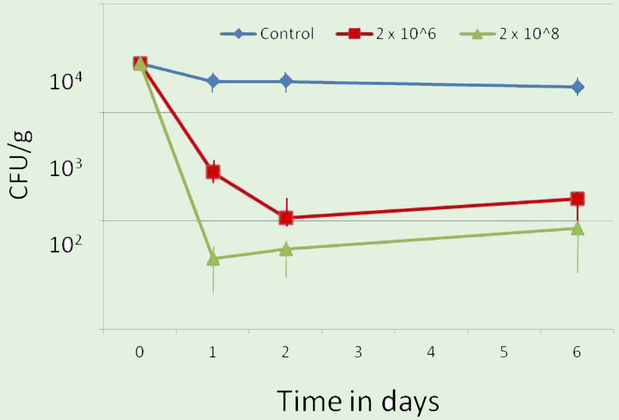

Fig 2. Dose dependant reduction of S. Enteritidis Se13. The higher phages dose of 2 x10^8 PFU/cm^2 results in a 2 log reduction after 24 hours. At the lower dose the reduction after 24 hour is slightly lower. In the experiments with three different serovars at a dose level of 2 x10^7 PFU/cm^2 a maximum reduction after 24 hours of 1.3 log was observed for all three strains (Data not shown).

Table 1 : Reduction of Salmonella positive samples in field trials with naturally contaminated poultry products

Sample	Total samples	Control positive samples of total	Treated positive samples of total	Reduction
Chicken liver	180	19/90	1/90	94%
Necks	120	50/60	21/60	58%
Breast	450	94/190	33/260	80%
Turkey backs	74	37/37	8/37	88%

Conclusions

- Phages significantly reduce *Salmonella* contamination both on artificially contaminated poultry products as well as on naturally contaminated meat.

- Maximum reduction is observed after 24 hours after which no continued activity is observed. Shorter contact time may be sufficient

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- Phages therefore offer a natural and organic addition to the poultry industry's food safety tool kit.