

New bacteriophage cocktail to prevent *Salmonella* infection in poultry and to be used as food disinfectant

Summary

Salmonellosis still remains as the second most commonly reported zoonotic disease in the EU. The major sources of human *Salmonella* infections are eggs and meat from pigs and poultry. Bacteriophages are viruses that only infect bacteria. Their high specificity, rapid killing kinetics on its target genus and their ability to self-replicate make them especially attractive as natural antibacterial products.

We have developed a successful bacteriophage cocktail active against *Salmonella enterica*, present in poultry and swine production. It may be administered as an additive on feed, water or by spraying. It is also useful as disinfectant of foods as well as on working areas of both farms and slaughterhouses. We are seeking a company partner to further develop the technology through a co-development and license agreement.

Innovative aspects and applications

- > This phage cocktail is highly effective and stable during long periods of time.
- > A continuous administration of this product to animals prevents food-animals for *Salmonella* colonization.
- > The efficiency of this cocktail has been successful as food disinfection.
- > Its usefulness in all the productive chain makes this product attractive, handy and feasible.

State of development

- > Bacteriophages were isolated from samples of cloacae or rectal swabs from broilers and from pigs, respectively. Three of them were selected in attention to their host range.
- > The parameters of their lytic cycle were characterized and they were morphological studied by electron microscope.
- > Phage's stability to different environmental conditions was also determined.
- > Phage's genomes were studied by PFGE and were sequenced.
- > Efficacy of the phage cocktail to control *Salmonella* was studied in vitro and in vivo models, obtaining a significant decrease of the bacterial concentration up to 4 or 5 log₋₁₀ cfu/mL and up to 5 cfu/g, respectively.
- > It has also shown to be useful as food's disinfectant in meat and vegetables decreasing the concentration up to 4 log₁₀cfu/g.

IP Rights

European Patent Application filed on 2011

Ongoing research

- > Final tests onto foods are being undertaken and results will be available within the last quarter of the year.
- > The usefulness of this product onto biofilms and different type of working surfaces is also assessed. Results are expected at the end of the second quarter of next year.

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The Invention

The bacteriophage cocktail that is herein presented is composed by three different bacteriophages at an equal concentration (1:1:1).

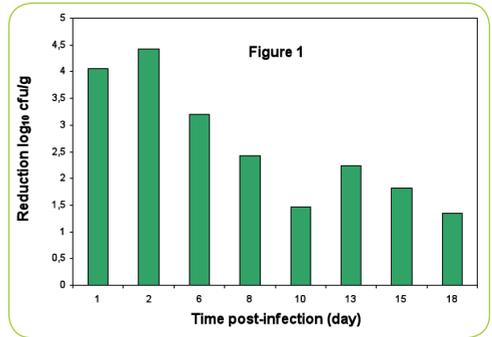
The ability to infect Salmonella by all three bacteriophages is maintained during more than 12 months at 40C and at a wide range of pH.

The genome of the three bacteriophages was completely sequenced and they are presumably safe.

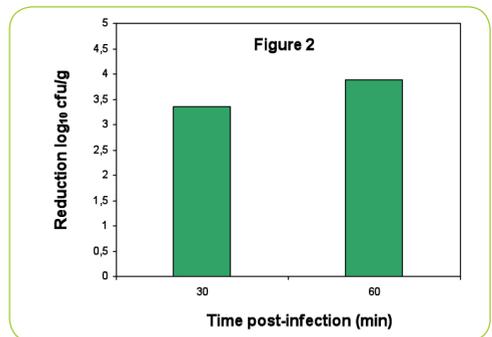
The applicability and efficiency of this invention has been tested in vitro studies onto prevalent serovars of Salmonella in poultry. Figure 1 shows as the treatment of Salmonella infected poultry with the bacteriophage cocktail produces a significant decrease of the Salmonella concentration in the caecum of animals along the time.

The cocktail was evaluated using different administration schedules to optimize its efficacy in chicks infected with Salmonella.

Studies on the efficacy of our invention onto food were tested. Figure 2 shows the Salmonella concentration reduction in lettuces, experimentally infected with Salmonella, after bacteriophage cocktail treatment.



► Fig 1. Effect of the administration of the bacteriophage cocktail in vivo



► Fig 2. Activity of the bacteriophage cocktail as food disinfectant (lettuce)

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