



IMMUNO VALLEY
Connecting Human and Animal Health

RESUPLYS: REDuction of Streptococcussuis infection by Use of Phages and LYSins

Managing Streptococcussuis infections using phage therapy and lysins

In the pig farming sector, one of the major problems worldwide is animals becoming infected with the bacteria *Streptococcussuis*. This bacteria can cause diseases such as meningitis, joint inflammations and pneumonia. Infection can damage the animals' welfare and result in major economic losses. The bacteria is widespread among pig farms.

The main problem caused by *S. suis* infections is the damage they cause to the pig farming industry, but in some very rare cases, the bacteria can also cause problems in humans. As *S. suis* infections are usually treated with antibiotics, the bacteria are becoming increasingly resistant to treatment. This not only applies to *S. suis*, but to other bacteria that occur in the pigs' intestines. This in turn creates a large reservoir of resistant bacteria that can exchange their genes with other bacteria, resulting in an even wider distribution of resistant bacteria.

The research line RESUPLYS studies whether *S. suis* can be controlled using bacteriophages (often abbreviated as 'phages') and lysins. Phages are viruses that infect and kill bacteria. Lysins are the enzymes that bacteriophages use to bore through the outer membrane of the bacteria. The advantage of using phages as opposed to antibiotics is that they are very specific: they only 'fit' with a single species of bacteria. One well-known disadvantage of phage therapy is that it can also result in a type of bacterial resistance, when the bacteria evolves to the point that the phage no longer 'fits' the bacteria. However, the phages evolve apace with the bacteria, so it is much easier to find and implement new variations than it is to develop new bacteria-specific antibiotics. Lysins do not present the problems of resistance. Until now, lysin studies have been limited to pathogens that occur in humans. The use of lysins to control *S. suis* is unique in the field.

RESUPLYS is searching for a suitable phage and lysin targeted specifically towards *S. suis*. The project will then test the effectiveness of the phage and the lysin in combating *S. suis*. Both approaches have proven to be effective in dealing with other bacteria. Phage therapy has been successfully tested as a treatment for both *Campylobacter* and *Listeria*; bacteria that can cause food poisoning in humans.

The goal of phage- and lysin therapies in treating infected pigs is to reduce the amount of bacteria to a level where the animals' natural immune system can eliminate the infection on its own. Due to the conditions inherent in intensive livestock farming, the animals' natural immune systems are occasionally placed under stress, such as when groups of animals are transported to another location. Antibiotics are currently used to help the animals during these periods, but phage- and lysin therapies may eventually become an effective alternative to antibiotics.

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