Artilysins - Novel antibacterial tools for industrial animal protein production

Alternatives to Antibiotics (ATA)
Challenges and Solutions in Animal Production

1. Antibiotic resistance - veterinary antibiotics
2. Also human antibiotics, including last resort antibiotics like Colistin are used in animal farming
3. Limited genetic variation in the production animal lead to increased problems with e.g. bacterial infections

⇒ THERE IS A CLEAR NEED FOR NOVEL SOLUTIONS
Resistance against new antibiotics is frequently observed before or soon after market introduction. Resistance is subsequently growing after market introduction. Massive costs are associated with antibiotic resistance.
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ARTILYSIN® - CONSTRUCTION

- large quantities necessary
- cytotoxic
- develops resistance

- Gram- positive bacteria only

- Gram- positive and
  Gram- negative bacteria
- No cytotoxicity
- No resistance development
Activity of Art-175: 25xMIC

Scale bar 4 µm, 5 sec/frame. Total duration 20 min 55 sec
HOW DOES ARTILYSIN® WORK?

Whole *Pseudomonas aeruginosa* cell

*ARTILYSIN®* degrades bacterial cell envelope

Cell lyses upon *ARTILYSIN®* treatment

99.9% of *Pseudomonas aeruginosa* are killed within 5 minutes after treatment with Artilysin®Art-175
Due to its design ARTILYSIN® are selective. Its selectivity leaves the natural, supportive bacterial flora intact, which avoids many unwelcomed side effects.
OVER BILLIONS OF YEARS, BACTERIA HAVE EVOLVED MECHANISMS TO SURVIVE EXPOSURE TO NATURALLY OCCURRING ANTIBACTERIALS.

RESISTANCE

PERSISTENCE

BIOFILM

DO THOSE MECHANISMS INTERFERE WITH ARTILYSIN® EFFICACY?
Bacterial persister cells are:

- a small fraction in bacterial populations
- less sensitive to antibiotics than the majority of bacterial cells
- in a dormant metabolic state, while even genetically identically to actively growing cells

Bacterial persister cells are supposed to play an important role in chronic infections.

ARTILYSIN® KILL PERSISTER CELLS

Art- 093 – *P. aeruginosa* PA14wt

Art- 175 – *P. aeruginosa* PA14WT / PA1255 (CF isolate)

Art- 175 – *A. baumannii* RUH134
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NO – they do not!
APPLICATIONS
Diagnosed infection with different strains of *Pseudomonas aeruginosa* (Art- 175). The dog was ineffectively treated with antibiotics for 6 weeks.

One day after treatment with Artilysin® the pressure pain, inflammation (redness, turgor) and suppuration was significantly reduced. Within less than 5 days, *Pseudomonas aeruginosa* was eliminated.
Diagnosed infection with *Pseudomonas spp.* (Art- 175) and *Staphylococcus intermedius* (Bat- 072). The infections were ineffectively treated with antibiotics for 12 months. 5 weeks after treatment with Artilysin® the wound is closed and the inflammatory dermal spot is healed.

Fig.1: Upper pictures show the healing of the paw at the beginning (left), 2 weeks after the treatment (middle) and 2-3 weeks later. The lower pictures show an inflammatory dermal spot before and after treatment.

5 weeks after treatment with Artilysin® the wound is closed and the inflammatory dermal spot is healed.
THANK YOU!

FOR YOUR ATTENTION!