Bacteriophage cocktail for controlling *Salmonella* in animals

**Overview**
The use of antibiotics as growth promoters is banned in Europe and is phasing out in the U.S., meaning new ways to control pathogens in food animals are needed. A bacteriophage cocktail has been developed that reduces *Salmonella* shed in the feces of calves. Because this treatment uses a mixture of bacteriophages, the chance of developing resistance to this treatment is reduced. This approach represents an opportunity in a multi-billion dollar market to provide an alternative to antibiotics.

**Advantages**
- Could be developed for administration by the farmer in feed or water to cattle, chickens, etc.
- Provides antibiotic-free treatment and potential prevention of pathogenic *Salmonella* infection
- Bacteriophage have been shown to be stable for months at room temperature

**Description**
*Salmonella* infection remains a problem on calf raising operations and in dairy herds, causing infection in adult cattle and up to 60% mortality in calves. Infected cattle do not always show symptoms and can shed up to a billion salmonellae per day, infecting other cattle in the herd. Bacterial infections have traditionally been controlled by continuous administration of antibiotics in animal feed. Regulatory changes affecting antibiotic use in animals are expected to decrease the global market for feed-based antibiotics by as much as $15 billion by 2018. Antibiotic-free alternatives for controlling bacterial infections could fill this market void and represent an opportunity for companies in animal health.

Proof of concept studies have been performed in calves using mixtures of three or five naturally occurring *Salmonella*-targeted lytic bacteriophages. Calves were infected with the pathogenic and multidrug resistant *Salmonella Newport*, serotype C that infects ruminants, humans, and other animals. Reductions of up to 99% of *Salmonella* shed in feces of treated vs control animals have been observed in acutely infected animals. Daily administration of the phage cocktails to prevent disease may be one way to replace the use of antibiotics as growth promoters.

**Status**
- A library of ~70 *Salmonella* Newport-targeted bacteriophages has been characterized
- Proof of concept studies performed in acutely infected calves using 5 and 7 phage cocktails
- Studies ongoing to examine use as prophylactic, stability of cocktails, and minimum dose.

**Licensing Opportunities**
- Bacteriophage are available as materials for exclusive or non-exclusive licensing
- Joint development opportunities include funded research or a joint venture

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*Graph is log scale. Eight 8-10 week old calves were challenged with *Salmonella Newport* by dose syringe. Four calves were treated at day 1 & 2 post-inoculation (black diamonds) with a mixture of three bacteriophages. Untreated calves served as controls. (*) denotes P < 0.05.*