Project Number & Title 2C121: A novel and safe fogging sanitiser for MRSA decolonisation and reduction of *Actinobacillus pleuropneumoniae* aerosol transmission between pigs

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Aims and Objectives

Aims:

1) To test an electrochemically activated solution, an anolyte generated by electrolysing a dilute sodium chloride solution in a four-chamber electrolytic cell by Ecas4 Australia, as a cost effective air decontamination process when administered as a dry fog that is safe, non-toxic and does not contribute to antimicrobial resistance, with high efficiency broad-spectrum disinfection capability and specific killing action against *Actinobacillus pleuropneumoniae* (*A. pp*) to prevent transmission between stock.

2) To determine whether the disinfection protocol proof-of-concept pilot can be up scaled to a workable model that could be regularly implemented in a farm setting for control and prevention of transmission of aerosolised bacterial pathogens including *A. pp*.

Objective: To develop a compound protocol that is safe, with no residual effect, has broad-spectrum bacterial activity and does not co-select for antimicrobial resistance.

Key Findings

SYBR green-dye-based real-time quantitative PCR was optimised to detect and quantify low levels of total bacteria and *A. pp* targeting the 16S rRNA and apxIVA genes, respectively, using previously published primer sets. Using the Coriolis air sampler device, the sample collection protocol to capture *A. pp*. from the farm environment was optimised and very low levels of *A. pp* (5.1×10^5 genomic units) were detected in both weaner rooms and grower/finisher sheds at a continuous flow farm with endemic pleuropneumonia. Furthermore, a novel step was introduced into the qPCR by treating samples with 50 µm propidium monoazide to differentially quantify live and dead bacterial cells in the sample, an ideal rapid quantitative assay for determining the effectiveness of aerosol disinfection methods.

A proof-of-concept trial was conducted in a recently vacated weaner room at the same continuous flow piggery using a protocol adapted from a previous Pork CRC project (2C-117). A 1-log10 reduction in total bacterial count was observed after the first hour of fogging, a 2-log10 reduction was observed after fogging for two and three hours, while 99.9% (3.7-log10) of total bacteria were effectively inactivated by Ecas4 dry fogging after five hours of discontinuous treatment.

Application to Industry

The outcomes of this innovative project will support application of Ecas4 technology specifically in disinfection of respiratory pathogens in the farm environment and fulfil the aims of Sub-Program 2C: Replacement of Antibiotics with Effective Integrated Health Strategies. An added bonus of this project is that we have optimised a diagnostic assay to detect low levels of *A. pp* (as little as 0.1 pg of DNA) from the air of the farm environment and a novel qPCR method to discern live bacteria from dead bacteria, addressing another Pork CRC Sub Program 2A: Novel Disease Diagnostics.