Australian Government
Department of Industry and Science
Business Cooperative Research Centres Programme
Pork CRC
CRC for High Integrity Australian Pork

2C-113: *Bacteriophage-displayed peptides for the control of pathogens in swine*

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Project Participants: CSIRO

Aims and Objectives:

Enterotoxigenic *Escherichia coli* (ETEC) is a pathogen of swine, causing diarrhoea in young piglets. Currently, ETEC is controlled by the therapeutic use of antibiotics; however, new approaches are needed due to the increasing resistance of *E. coli* to commonly used antibiotics. Controlling ETEC through the use of novel, pathogen-specific antimicrobials would deliver benefits in terms of reducing the current levels of antibiotics used by the Australian pork industry. Receptors/ epitopes on the cell surface of ETEC play a significant role in its colonisation and persistence within the swine herd and thus represent a significant target for disruption by inhibitory antagonistic molecules.

The overall aim of this project was to discover phage displayed peptides that could potentially be used as a replacement for antibiotics for the control of ETEC in young piglets.

Key Findings

A novel subtractive phage display approach was used to select for peptides binding to the cell surface of *E. coli*. In total, 47 phage displayed peptides were isolated, representing 43 unique sequences.

The key findings are:

1. A group of five phage displayed peptides were able to bind to the majority of swine *E. coli* isolates (46 of 49 isolates tested).

2. Two custom synthesised peptides (EBT3/2 and 2OBT3/1) were antimicrobial towards swine *E. coli* isolates with one (2OBT3/1) being bactericidal.

3. Two custom synthesised peptides (p2ECT2/4 and pJCT3/2) were found to self-assemble to form a gel-like material.

Application to Industry

This project has resulted in peptides with potential industry applications.

1. Two unique peptides were isolated (EBT3/2 and 2OBT3/1) that could potentially represent a new class of antimicrobials for controlling swine *E. coli* in young piglets. This would deliver benefits in terms of reducing the current level of antibiotics used by the Australian pork industry as well as peptides that may have the potential to be antimicrobial towards antibiotic-resistant *E. coli* isolates.

2. Two peptides (p2ECT2/4 and pJCT3/2) have the potential to be further developed into an antimicrobial gel with potential applications for treating wounds or coating medical devices when combined with an antimicrobial peptide.

3. Five phage displayed peptides have the potential to be further developed into a rapid diagnostic device, specific for swine *E. coli*.