



# Australasian Pork Research Institute Ltd APRIL

## PROJECT SUMMARY

### Project Number and Title:

7C-001 *BONIFF-SMEC: An in-field practical delivery mechanism for improved weaner piglet performance*

### Project Leader:

Mr. Steven Lydeamore (Anatara Lifesciences Ltd.).

### Project Participants:

Dr Diana Turpin (Murdoch University); Elise Davine (Ridley Agriproducts Pty Ltd.).

### Aims and Objectives:

This proof-of-concept experiment aimed to test a bromelain-based formulation (BONIFF) in combination with a semi-moist extruded creep (SMEC) feed in weaning pigs under an enterotoxigenic F4 *Escherichia coli* (F4-ETEC) challenge to determine the efficacy of this combined formulation on aspects of pig performance and enteric health after weaning.

### Experimental design:

The experiment, using 100 newly-weaned male pigs weaned at approximately 21 days of age obtained from a commercial farm, was a randomised block design that comprised five treatments, being:

1. Standard diet fed for days 1-11 after weaning, NO F4-ETEC challenge;
2. Standard diet fed for days 1-11 after weaning, WITH F4-ETEC challenge;
3. BONIFF/SMEC fed for days 1-11 after weaning, WITH F4-ETEC challenge;
4. BONIFF/SMEC fed for days 1-11 after weaning, NO F4-ETEC challenge;
5. SMEC fed for days 1-11 after weaning, WITH F4-ETEC challenge.

The standard diet and the BONIFF/SMEC diets did not contain a pharmacological level of ZnO nor a commercial level of organic acid products (organic acids for manufacturing purposes only were added), whereas the SMEC diet alone (Treatment 5) contained commercially relevant levels of ZnO, organic acids and phytogetic compounds. Pigs were kept in groups of 5 pigs per pen with 4 pens allocated per dietary treatment (n = 20) in a building maintained at ~28° C, and on days 5 and 6 after weaning, were inoculated with F4-ETEC or were sham-challenged. Monitoring of production variables and measurements of enteric health, including post-weaning diarrhoea (PWD) and medications administered therapeutically for PWD, were recorded.

## Key Findings:

1. The BONIFF preparation was found to be stable on the SMEC pellets from the time of delivery to the end of the experiment, a period of 6-7 weeks, in March/April 2021. Stability studies have continued beyond the trial period and continue to demonstrate good stability. This indicates that post-extrusion coating of BONIFF can viably be done.
2. Post-weaning diarrhoea occurred in all treatments, irrespective of F4-ETEC challenge or sham challenge, and ranged from 40% (Standard diet) to 90% [BONIFF-SMEC diet and SMEC (only) diets]. There was no major mortality observed in this experiment (3%), and it was not attributable to any of the treatments offered.
3. Pigs fed a BONIFF-SMEC diet, with or without F4-ETEC inoculation, and pigs fed a SMEC (only) diet (that comprised a pharmacological level of ZnO and commercial levels of organic acids and phytogenics), generally performed better than pigs offered a Standard diet, also irrespective of with or without F4-ETEC inoculation. This period of greater performance generally coincided with the days immediately following the F4-ETEC challenge.
4. Pigs fed the BONIFF-SMEC diet performed similarly to pigs fed the SMEC (only) diet comprising commercially relevant levels of ZnO and organic acids and phytogenic products.
5. Pigs fed BONIFF-SMEC (irrespective of F4-ETEC or sham-challenge) and SMEC (only) generally showed higher values for faecal consistency and the diarrhoea index throughout the study, indicative of looser faeces and more diarrhoea, compared to the pigs offered the Standard diets. More therapeutic antibiotic treatments were also required.
6. Pigs fed Treatment 4, i.e., BONIFF-SMEC fed for days 1-11 after weaning, NO F4-ETEC challenge, showed statistically similar *E. coli* (shedding) scores in the post-F4-ETEC inoculation period to pigs in the two Standard diet treatments, that in turn were lower than pigs in Treatments 3 and 5.

## Applications to Industry:

Given the results pertaining to faecal F4-ETEC (shedding) and antibiotic medication treatments in the BONIFF-SMEC diet not challenged with ETEC, relative to the Standard diets with and without F4-ETEC challenge, further evaluation of this combination in a less F4-ETEC challenged environment is suggested.