

## **2C-110: Dietary manipulation of the pro-inflammatory cascade to minimise impacts on production and health indices in weaner pigs experimentally infected with an enterotoxigenic strain of *E. coli***

### **Project Leader**

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### **Project Participants**

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### **Aims and Objectives**

To investigate whether dietary supplementation of vitamin E and a low dose acetylsalicylic acid (aspirin), a cyclooxygenase inhibitor, will synergistically reduce production of PGE<sub>2</sub> and hence reduce the infection responses in weaner pigs.

### **Key Findings**

Experiment 1 (*E. coli* infection study) demonstrated that a low dose of aspirin supplementation (125 ppm) significantly improved amino acid utilization efficiency (as assessed by circulating plasma urea level) and tended to decrease PGE<sub>2</sub> production in the liver without affecting small intestinal histology and tight junction protein mRNA expression in the jejunal epithelium, while vitamin E supplementation greater than 100 IU significantly decreased both the acute reduction of plasma vitamin E content after weaning and plasma haptoglobin content after *E. coli* infection. Supplementation of aspirin improved average daily gain and feed conversion efficiency after weaning.

Experiment 2 (Commercial validation study) showed that either a low dose of aspirin or supplementation of 250 IU vitamin E in diets significantly improved feed conversion ratio until week 3 post-weaning.

However, overall, there was no synergistic effect of the combined supplementation of aspirin and vitamin E on performance, intestinal barrier function and immune function of weaned pigs.

It is concluded that aspirin and vitamin E supplementation independently improved feed utilization efficiency but no synergistic effect was observed on performance, intestinal barrier function and immune function of weaned pigs. Based on tissue measurements, it is conceivable that aspirin supplementation improved performance of weaned pigs by reducing inflammation-associated amino acid waste through modulation of PGE<sub>2</sub> biosynthesis, while vitamin E supplementation improved performance of pigs by reducing the severity of infection through an eicosanoid-independent pathway such as oxidative tissue damage due to its antioxidant property.

### **Application to Industry**

As a result of the outcomes in this study the following recommendations have been made:

1. A low dose of aspirin (125 ppm), pending any successful application to the APVMA in the future, is an effective way to modulate biosynthesis of immunosuppressive molecule PGE<sub>2</sub> and hence to reduce the immunity-associated amino acid waste.
2. Supplementation of greater than 100 IU vitamin E is recommended to decrease the severity of *E. coli*-associated infection through an eicosanoid-independent pathway such as oxidative tissue damage due to its antioxidant property around weaning.