THE EFFECT OF AN ORGANIC ACID BLEND, CINNAMALDEHYDE AND A PERMEABILISING SUBSTANCE ON THE INHIBITION OF BACTERIAL GROWTH *IN VITRO* AND GROWTH PERFORMANCE OF WEANING PIGS

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Abstract. The effect of an organic acid blend (**AB**; formic, propionic and acetic acid), cinnamaldehyde (**CA**) and a permeabilising substance (**PS**) was tested *in vitro* on the inhibition of 4 strains of pathogenic bacteria and *in vivo* on growth performance of weaning pigs. The strains for the *in vitro* trial were cultivated and incubated over night at 37°C. The main culture incubated for 4 hours before being used for a microplate assay and the inhibitory effect of the AB and its combination with CA and a PS was calculated. For the *in vivo* trial, 60 pigs weaned at 28 days, weighing 8.72 kg (s.d. +/- 1.15 kg) were used in a 56 day experiment. Pigs were assigned to two different treatments: a standard diet or the standard diet supplemented with the AB, CA and the PS. Synergistic effects on the inhibition of *Salmonella* Enteritidis, *Salmonella* Typhimurium, *E. coli* O55:K59 (B5):H and *E. coli* O128:H2 were found when adding CA to the AB. The AB alone inhibited the growth of *Salmonella* Enteritidis, *Salmonella* Typhimurium, *E. coli* O55:K59 (B5):H and *E. coli* O128:H2 by 53.5, 59.3, 55.2 and 33.3%, respectively, while the addition of CA to the AB resulted in an inhibition of 99.0, 99.8 and 100.0% of *Salmonella* Enteritidis, *Salmonella* Typhimurium and the two *E. coli* strains. Synergistic effects on the inhibition of the four test strains were also found when adding the PS to the AB and the CA. After adjusting the growth medium, the AB combined with the CA inhibited growth of *Salmonella* Enteritidis, *Salmonella* Typhimurium, *E. coli* O55:K59 (B5):H and *E. coli* O128:H2 only by 6.9, 3.9, 29.5 and 2.3%, respectively, whilst the addition of the PS resulted in an inhibition of 86.2, 100.0, 70.5 and 100.0%. In the *in vivo* trial, the group fed the diet containing the AB, CA and the PS had only a slightly higher average daily feed intake (**ADFI**) compared to the control group (1028 vs. 982g; $P>0.05$), while the average daily weight gain (**ADG**) was significantly ($P<0.05$) higher in the experimental group (517 vs. 481g) resulting in an improved feed conversion ratio (**FCR**; 1.99 vs. 2.04) and a significantly improved final body weight (37.7 vs. 35.6 kg) of pigs fed the experimental diet. Results of the two experiments indicate that the addition of CA and PS to AB inhibits bacterial growth more effectively and significantly improves growth performance of weaning pigs.

Keywords: organic acids, cinnamaldehyde, permeabilising substance, pathogenic bacteria, weaning pigs.