Innovation in action

Developing an effective replacement for zinc oxide in young pigs

CIEL supported industry-led research

Challenge

Pork is a significant source of protein, but in the recent past prophylactic antibiotic use, and misuse, in pigs has contributed to a dangerous increase in antibiotic resistant organisms.

The use of prophylactic antibiotics has been banned in most countries and replaced with zinc oxide (ZnO), advocated to be an effective replacement treatment. However, ZnO itself has been linked with antimicrobial resistance and environmental pollution and its use is being phased out. Therefore, ZnO alternatives are urgently required.

aga nanotech SRUC

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Action

Looking to develop an effective replacement treatment for ZnO in pigs, R&D company AGA2tech teamed up with Scotland's Rural College (SRUC) to investigate the effectiveness of Peracetic acid (PAA), generated in water from precursors sodium percarbonate (SP) and tetraacetylethylenediamine (TAED), as a replacement for ZnO to control diarrhoea in pigs and promote growth. In-water PAA has recently shown to improve broiler performance whilst acting on microbial concentration. This corroborates PAA's possible use as an antimicrobial alternative.

This project aimed to deliver the first evidence that PAA delivered in-water via precursors administration could replace the use of ZnO to maintain health and performance in weaning pigs. In particular, this project investigated the impact of two in-water PAA levels of inclusion on performance and gut health via quantification bacterial concentration in different gut locations in weaned pigs, in the presence of both negative and positive (ZnO) controls. Pending confirmation of its ZnO replacement potential, application of precursor-derived PAA can be developed to offer a realistic, effective and environmentally benign replacement treatment in this market.

Impact

The treatment was shown to be safe, equivalent to ZnO in preventing weaner diarrhoea and, crucially, no environmentally-compromising residues are produced in slurry. PAA represents a sustainable alternative to ZnO due to its degradation chemistry which generates biodegradable and benign residues. PAA was also found to be a valid alternative to ZnO as it improved faecal score in all the treated pigs in the same way as it was recorded for ZnO ($P<0.05$). Further trial work will enable the effectiveness of the technology to be demonstrated on a larger scale and AGA2tech have funded SRUC to conduct genomic follow up testing. In parallel to this study, in-vitro EN standard testing has shown the study test concentrations of PAA to be effective against a range of MDROs including Salmonella.

CIEL, Innovation Centre, York Science Park
Heslington, York YO10 5DG
T: 01904 567716 / **E:** enquiries@cielivestock.co.uk
www.CIELivestock.co.uk

UKRI Innovate UK