THE ERA AFTER ANTIMICROBIAL GROWTH PROMOTERS: CONTROLLING LAWSONIA INTRACELLULARIS WITH PLANT-BASED FEED ADDITIVES

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INTRODUCTION

There is currently an urgent need to find a replacement for the antimicrobial growth promoters (AGPs) which led to antibiotic resistance in pathogenic bacteria. On the other hand, with AGPs having been removed from farm animals' diets, the increased incidence of enteric infections has caused increased therapeutic application of antibiotics, and this extra use of antibiotics has also led to increased antibiotic resistance. For example, an increase in diarrhoea, weight loss, and mortality due to Lawsonia intracellularis (Li) occurred in pig production after the removal of AGPs. However, reduced susceptibility of Li to antibiotics has been observed, but the development of antibacterial resistance is occurring under the radar because it is hard to cultivate this bacterium. Li, the causative agent of pig ileitis, is one of the most economically important pathogens in pig production all over the globe. Our insights on how to replace AGPs and reduce the use of antibiotics are coming from the study in which the efficacy of the plant-based feed additive (PFA) PATENTE HERBA® PLUS (PHP) in controlling Li was assessed on four farms with different biosecurity measures.

METHODOLOGY

The study involved a total of 576 seven-week-old piglets kept on four different pig farms (BS1, BS2, BS3, and BS4) on which the levels of external, internal and total biosecurity measures (BS) were determined. Each farm trial lasted 28 days and 144 piglets were divided equally to the control group, which consumed a basic diet, and a treatment group that consumed a basic diet with the addition of 2 kg/t feed of PHP. On days 0, 14, and 28, the number of Li was measured via real-time qPCR assay in faecal samples. The production parameters such as body weight, daily and total weight gain (WG), daily and total consumption and feed conversion ratio (FCR) were monitored on each farm. Results are presented as means and standard deviations. For statistical analysis t-test, the two-way ANOVA (PHP treatment, BS and PHPxBS) and Spearman coefficient of correlation were used. The level of $p< 0.05$ was considered significant.

RESULTS

The total BS on farms was: BS1 60 %, BS2 64 %, BS3 77 %, and BS4 86 %. On farms BS1 and BS2, a significantly lower number of Li were found in the faeces of piglets in the treatment group compared to the control group on days 14 (BS1 $p=0.0080$ and BS 2 $p=0.0470$) and 28 (BS1 $p=0.0015$ and BS2 $p=0.0176$). On farms BS3 and BS4, there were no significant differences between the control and treatment groups of piglets in the number of Li in faeces for all three examined periods ($p>0.05$). A significant moderate negative correlation was determined ($r=-0.664$, $p<0.01$) between the number of Li in faeces and on-farm BS. A two-way analysis of variance revealed a significant effect of the PHP supplementation and BS of farms on the total and daily WG of piglets ($p<0.05$). BS on farms significantly affected both total and daily feed consumption ($p=0.0435$ and $p=0.0434$, respectively), while the addition of PHP in piglet feed also had a significant effect on FCR ($p=0.046$). No significant influence of the interaction of these two parameters on the total and daily WG, total and daily feed consumption and FCR during the experiment was found ($p>0.05$).

DISCUSSION

The total BS of all four examined farms in this study was higher than the average BS on farms in Serbia (58 %) and globally (64 %), with the exception of BS1, where total BS was lower compared to the average global values (60 %). Our research showed that the use of PHP is effective in decreasing the numbers of Li in pig faeces on farms with lower biosecurity levels. On the other hand, when biosecurity levels were high, the number of Li in the faeces was low, so it was unlikely to cause clinical ileitis, and consequently, the beneficial effects of PHP in feed could not be observed. Nevertheless, the overall production parameters were the best on the farm with the highest BS that used PHP. Based on the results of this study we can conclude that in seeking to replace AGPs and reduce applications of antibiotics, reducing the presence of pathogens via improved biosecurity measures and using PFAs to reduce pathogenic bacteria load, stabilise and nurture microbiome and enhance the gut health of animals are key steps. In the next steps, the focus of the scientific community and industry should be on monitoring potential resistance in bacteria while using PFAs.