

Use of acidifiers in the nursery phase as an alternative to antimicrobials swine growth promoters

Eduardo M. Ternus¹, Lucas Piroca¹, Igor D. Praxedes-Campagnoni¹, Cleandro Pazinato², Marco A. Callegari², Caio A. da Silva²

¹Vetanco S.A., ²Akei Animal Research.
E-mail: eduardo@vetanco.com.br

Introduction

The current use of antibiotics growth promoters (AGP) is associated with the transmission of resistance genes and residues in meat (5). Several alternative additives to AGP have been tested (2), highlighting prebiotics and organic acids (6,7). In the nursery is where the challenges of AGP removal are most evident, because piglets are subjected to a series of stressors associated with physiological, enzymatic and immune immaturity of the gastrointestinal tract (6). The objective of this study was to evaluate the use of a blend of prebiotics and organic acids against a colistin diet, on performance and diarrhea control in nursery piglets.

Materials and Methods

150 pigs from PIC genetics (castrated males and females) were used, 22 days of average age and 5.568 ± 0.781 kg live weight. Housed in stalls with 2.55m² of area. The experimental design was randomized blocks with three treatments and 10 repetitions per treatment, with the five animals stall being the experimental unit. The treatments were: T1 - Negative Control; T2 - Colistin - 10 mg / kg; and T3 - Mannooligosaccharides + Beta-glucan + Ammonium formate, Formic acid, Ammonium propionate and acetic acid (1 kg / ton). The diarrhea score was performed daily (8). Calculation of diarrhea index: Diarrhea Index = number of days with diarrhea / number total days of the test. On the 24th day of housing one animal per stall was randomly selected and euthanized for cecal content collection for quantification of *Lactobacillus* and *E. coli* and total coliforms. Parametric data were subjected to analysis of variance and means to Tukey test, using statistical program R version 3.3.0 (2016-03-05). Nonparametric data were evaluated by Chi-square test. Differences with ≤ 0.05 were considered statistically significant.

Results

Differences in favor of groups T2 and T3 were observed in relation to T1 for daily weight gain (DWG) and feed conversion (FC) in the total evaluation period (Table 1). For diarrhea score 3, group T3 showed intermediate result ($P > 0.05$), compared to T1 and T2 (Table 2), with the latter showing better effects ($P < 0.05$) compared to T1.

Conclusions and Discussion

As for the FC, the results obtained in the calculation of the whole experimental period were similar where they registered advantages for diets with organic acids (2). The improvement in FC with the use of dietary acidifiers results from the probable better utilization of dietary protein, added to the antimicrobial action of organic acids (1,3). In this sense, our results were similar to studies

using organic acids compared to Tiamulin (30 ppm) and also found no differences between treatments (5). The tendency of diarrheal symptoms to improve is in line with findings in various literature (1,2,7). T2 had higher cecal *E. coli* and total coliform counts compared to T1 and T3, while T1 and T3 were similar. This may suggest intestinal microbiota dysbiosis in T2 at the therapeutic dose used. (1). There was no statistical difference for the *Lactobacillus* count between treatments, but T3 favored the reduction of *E. coli* and fecal coliforms in relation to T2, not differing from T1. Nursery phase diets supplemented with a combination of Mannooligosaccharides + betaglacans + acidifiers provide similar performance to colistin supplemented diets and promote good antibiotic stewardship. Based on the results of this study we can conclude that acidifiers are a promising alternative to the growth promoter antimicrobials used in pig farming.

Table 1. Average performance values of piglets submitted to experimental treatments.

DATA	TREATMENTS ¹			P value
	T1	T2	T3	
DWG	0,356	0,375	0,366	0,197
FC	1,679 ^b	1,602 ^a	1,593 ^a	0,070

^{a,b} means followed by distinct letters on the line indicate difference by Tukey test ($P < 0.05$).

Table 2. Occurrence values of diarrheal cases, scores 2, 3 and diarrhea index of piglets submitted to experimental treatments.

SCORE	TREATMENTS ¹		
	T1	T2	T3
2	0	0	0
3	21 ^b	09 ^a	14 ^{ab}
Diarrhea Index	0,42	0,18	0,28

^{a,b} means followed by distinct letters on the line indicate difference by the chi-square test ($P < 0.05$).

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