Effect of amoxicillin, ceftiofur, doxycycline, tiamulin and tulathromycin on the antibody response of piglets vaccinated against *Lawsonia intracellularis*

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Background and Objectives

The prophylactic and metaphylactic use of antimicrobials is commonly used in conjunction with the vaccination procedure in Brazil, and their effect can go beyond the antimicrobial boundary and affect the immune system (1; 2). The objective of this study was to evaluate the effect of different antimicrobials commonly used in the nursery phase on the antibody response induced by Porcilis Ileitis, an inactivated-based vaccine formulated with Lawsonia intracellularis.

Material and Methods

A total of 144 weaned piglets were divided into 9 different groups **(Table 1)**. The piglets were vaccinated intramuscularly with a single dose (2mL) of Porcilis® Ileitis (Merck Animal Health, Madison, NJ, USA) at 30 days of life. Before (D0) and after vaccination (D7, D14, D21, D28, and D35), serum samples were collected and analyzed by Flow Cytometry Antibody Test (FCAT) to detect anti-*L. intracellularis* (Li) IgG. The comparison of anti-Li IgG levels at different moments was performed using the two-way ANOVA test (GraphPad Prism 9.0 software).

Table 1. Description of the 9 different experimental groups of animals according to whether they received the vaccine against L. intracellularis associated or not with the use of antimicrobials.

Experimental groups	Vaccine*	Antimicrobials	
G1	unvaccinated	not treated	-
G2	vaccinated	not treated	-
G3	vaccinated	treated	ceftiofur
G4	vaccinated	treated	tildipirosin
G5	vaccinated	treated	tulathromycin
G6	vaccinated	treated	amoxicillin
G7	vaccinated	treated	doxycycline
G8	vaccinated	treated	florfenicol
G9	vaccinated	treated	tiamulin

Results

Anti-Li IgG levels on day D35 were significantly (p < 0.001) lower in animals that received ceftiofur (G3), doxycycline (G7) and tulathromycin (G5) compared to the group G2 that was only vaccinated. In contrast, amoxicillin (G6), florfenicol (G8), tiamulin (G9) and tildipirosin (G4) did not affect the antibody levels. The most intense negative effect (reduction of 41.15% in the IgG levels) was found in group G3, treated with ceftiofur.
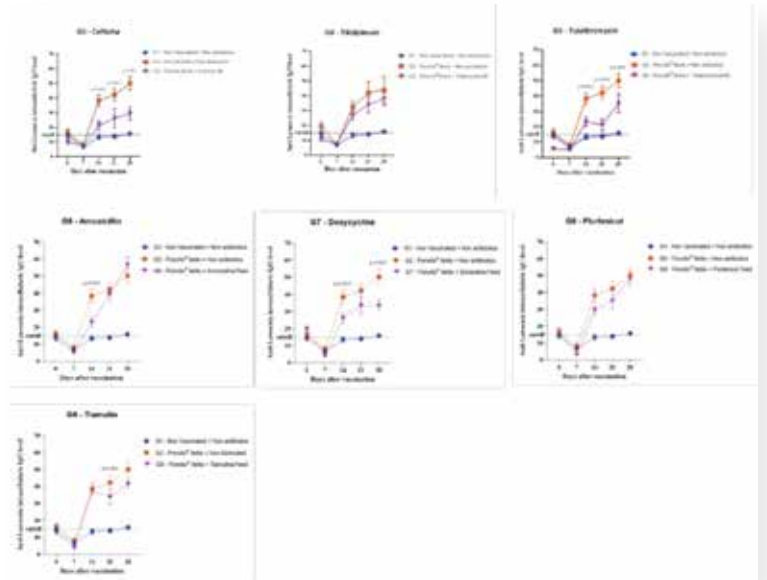

Figure 1. Immunoglobulin G (IgG) levels for the Li antigen for G1- unvaccinated and without antimicrobials; G2 – vaccinated and without antimicrobials; G3 to G9 – vaccinated and with antimicrobials (G3 - ceftiofur; G4 - tildipirosin; G5 – tulathromycin; G6 - amoxicillin; G7 - doxycycline; G8 – florfenicol and G9 – tiamulin). Significant difference between groups is indicated by p (p<0.05).

Discussion and conclusion

Our results demonstrated that the use of some antibiotics during the development of the adaptive humoral immune response can affect the serological potency of immunogenic vaccines. This negative effect may be especially important in vaccines whose antibody response needs to reach its maximum level in the early stages of nursery phase (e.g. vaccines against *Glaesserella parasuis* and *Streptococcus suis*). Future studies need to be conducted to understand whether the reduction in antibody levels observed here is temporary or permanent.

[1] POMORSKA-MÓL, M. et al. Effects of amoxicillin, ceftiofur, doxycycline, tiamulin and tulathromycin on pig humoral immune responses induced by erysipelas vaccination. Veterinary Record, v. 178, n. 22, p. 559-559, 2016.

[2] POMORSKA-MÓL, Małgorzata et al. Ceftiofur hydrochloride affects the humoral and cellular immune response in pigs after vaccination against swine influenza and pseudorabies. BMC Veterinary Research, v.11, p.1-8, 2015.