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Efficacy of Suiseng® Diff/A vaccine and its associated use with Suiseng® Coli/C against *C.difficile* and *C.perfringens* type A

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Introduction

Clostridioides difficile (Cdiff) and *Clostridium perfringens* type A (CpA) are two gram-positive spore-forming anaerobic bacteria responsible for neonatal diarrhoea in suckling piglets[1,2]. Neonatal diarrhoea is a relevant problem in swine industry, since it can lead to mortality and morbidity, reduced growth rates and increased use of antimicrobials. Suiseng® Diff/A (Diff/A) and Suiseng® Coli/C (Coli/C) are two vaccines covering multiple causative agents of neonatal diarrhoea (Table 1).

The aim of this study was to demonstrate the efficacy of the Diff/A vaccine administered alone or associated with Coli/C in pregnant sows to protect their progeny against Cdiff and CpA after challenge.

Table 1. Composition of the vaccines.

Product	Antigenic composition
Suiseng® Diff/A	α-toxoid of *Clostridium perfringens* type A TcdA and TcdB toxoids of *Clostridioides difficile*
Suiseng® Coli/C	F4ab, F4ac, F5, F6 and LT toxoid of *E.coli* ß-toxoid of *Clostridium perfringens* type C α-toxoid of *Clostridium novyi* type B

Methods

Three groups of 5 pregnant sows, seronegative against Cdiff and CpA, were intramuscularly vaccinated (6 and 3 weeks before farrowing) according to the manufacturer's instructions. One group was vaccinated with Diff/A (2 ml/sow), another group was vaccinated with Diff/A associated with Coli/C (4 ml/sow) and the control group was injected with PBS (4 ml/sow). After farrowing, 24h-colostrum-fed piglets were challenged with CpA or Cdiff and monitored for clinical signs and mortality for 5 days. The piglets were necropsied and macroscopic lesions scored.

Results

Cdiff challenge induced 100% mortality in piglets from the control group, whilst piglets from both vaccinated groups demonstrated prevention of mortality (Figure 1). Moreover, clinical signs and macroscopic lesions were significantly reduced in the vaccinated groups (Figure 2).

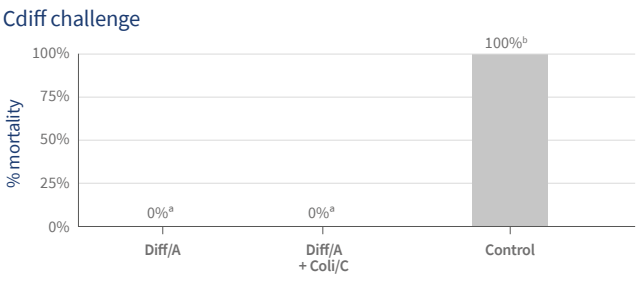

Figure 1. Mortality after Cdiff challenge. Chi-squared test, [ab]different superscripts indicate statistically significant differences *(p<0.05).*

Table 1. Clinical signs and macroscopic lesion score after Cdiff challenge. ANOVA and Kruskal-Wallis, [ab]different superscripts indicate statistically significant differences *(p<0.05).*

Group	Clinical signs Mean ± SD	Macroscopic lesions Median (interquartile range)
Diff/A	0.8 ± 0.8ª	1.0 (2)ª
Diff/A + Coli/C	1.5 ± 1.0ª	2.0 (2)ª
Control	3.2 ± 1.1ᵇ	8.0 (2)ᵇ

CpA challenge also induced 100% mortality in the control group, whilst a significant reduction in mortality was observed in piglets from vaccinated sows (Figure 3). Clinical signs and macroscopic lesions were significantly reduced in both vaccinated groups (Figure 4).

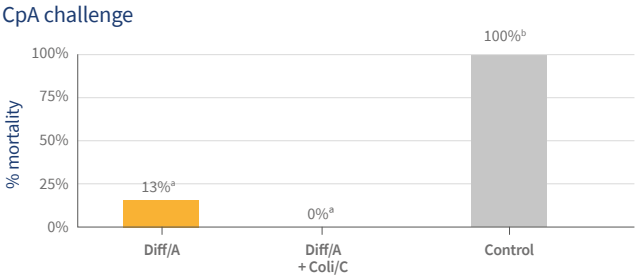

Figure 2. Mortality after CpA challenge. Chi-squared test, [ab]different superscripts indicate statistically significant differences *(p<0.05).*

Table 2. Clinical signs and macroscopic lesion score after CpA challenge. ANOVA and Kruskal-Wallis, [ab]different superscripts indicate statistically significant differences *(p<0.05).*

Group	Clinical signs Mean ± SD	Macroscopic lesions Median (interquartile range)
Diff/A	1.7 ± 0.8ª	2.0 (1)ª
Diff/A + Coli/C	2.5 ± 1.1ª	1.0 (0)ª
Control	3.5 ± 0.4ᵇ	9.0 (1)ᵇ

Conclusions

Diff/A and Diff/A + Coli/C vaccination prevent mortality and reduce clinical signs and macroscopic lesions after Cdiff challenge and reduce mortality, clinical signs and macroscopic lesions after CpA challenge. Thus, these results fully support the efficacy of the Diff/A vaccine administered alone or in association with Coli/C.

References

1. Songer JG, Uzal FA. Clostridial enteric infections in pigs. J Vet Diagn Invest 2005; 17:528-536.
2. "Diseases of Swine" (2019). *Veterinary Diagnostic and Production Animal Medicine Books*. 1. Pp 792-8065