

# PREVALENCE OF THE PATHOGENICITY FACTORS OF THE ENTEROTOXIGENIC *ESCHERICHIA COLI* AND *CLOSTRIDIUM PERFRINGENS* TYPE C PER PCR FROM 2017 TO 2019 IN BRAZIL

Rocha, M.; Ibanez\*, G.

\*Corresponding author ([gabriela.ibanez@hipra.com](mailto:gabriela.ibanez@hipra.com))

HIPRA Saúde Animal, Ltda.

## INTRODUCTION

*Escherichia coli* and *Clostridium perfringens* are part of the intestinal microbiota of swine, a dysbiosis-causing diarrhea related to these agents (1). For a correct diagnosis, it is important to check the presence of pathogenicity factors as the bacterial isolation only does not indicate that these agents are causing diarrhoea as they are commensals of the bacterial flora. One of the most effective techniques used is the detection of virulence factors, such as the presence of fimbriae F4, F5, F6, the heat-labile toxin (LT) of *E. coli* and the toxin  $\beta$  of *C. perfringens* type C, through a quantitative PCR. The purpose of this study was to investigate the prevalence of pathogenicity factors of Enterotoxigenic *E. coli* (ETEC) and *C. perfringens* type C, as the main case of young piglet diarrhea through fecal samples collected between 2017 and 2019.

## MATERIALS AND METHODS

From January 2017 to October 2019, 245 fecal samples were collected from suckling pigs with symptoms diarrhea, from different regions of Brazil. The samples were impregnated with FTA ELUTE cards (Whatman Inc., Florham Park, NJ), sent to DIAGNOS (HIPRA Brazil) and processed with the multiplex Polymerase Chain Reaction (PCR) technique to detect the genes that codify the adhesion factors F4, F5, F6 and the LT toxin of *E. coli* and  $\beta$  toxin of *C. perfringens* type C.

## RESULTS

Among the 245 samples analyzed, 78 (31.84%) were positive and 167 (68.16%) were negative for the pathogenicity factors (Figure 1). The prevalence of these pathogenicity factors in the 78 positive samples was 35.90% for F4; 2.56% for F5; 19.23% for F6; 29.49% for LT and 12.82% for  $\beta$  toxin (*C. perfringens*), as illustrated in Figure 2. The values found are similar to the reports of prior works (3).

In newborn piglets, the strains of ETEC usually present the fimbriae F4, F5 and F6. The F4 receptors are expressed in swine's enterocytes during their whole life. The receptors for fimbriae F5 and F6 are expressed with lesser intensity in older piglets (2). As regards to LT toxin, the genes involved in their synthesis are located in the plasmids where the genes for F4 (4) are also found. The *E. coli* adhere to the intestinal cells via specific receptors, then, the LT enterotoxin is produced in the intestinal mucous membrane and links to the receptors in the surface of the enterocyte, activating the adenyl cyclase, causing the secretion of sodium chloride and water by osmosis, generating a condition of secretory diarrhea (2). The passive immunity against enteric infections comes from the colostrum and

milk; the antibodies inhibit the bacterial adherence to the receptors in the enterocytes and neutralize the activities of the enterotoxins produced by *E. coli* and *C. perfringens*. A correct sow immunization, correct piglet colostrum and milk intake and the infection pressure control could reduce the incidence of infectious diarrhea in the piglets.

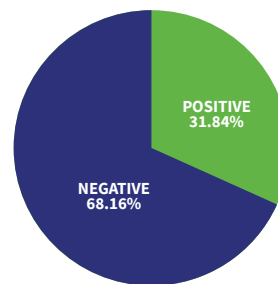


Figure 1. Results of PCR test conducted in the DIAGNOS from 2017 to 2019.

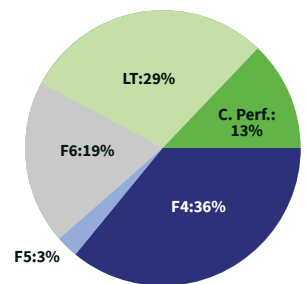


Figure 2. Distribution of PCR test positive per pathogenicity factors

## CONCLUSIONS AND DISCUSSION

The multiplex PCR is a crucial tool to aid the diagnosis of new-born diarrhea, the positivity for the pathogenicity factors of *E. coli* and/or of *C. perfringens*, can indicate the involvement of these agents in the conditions of diarrhea.

## REFERENCES

1. Dubreuil J.D. 2008. *E. coli* STb toxin and colibacillosis: knowing is half the battle.
2. Fairbrother J.M.; Gyles C.L. 2012. Post-weaning *E. coli* diarrhea and edema disease.
3. Ibanez, G. et al. 2017. Detecção de diferentes fatores de patogenicidade da *E. coli* ETEC e *Clostridium Perfringens* tipo C no Brasil.
4. Boer lin P. et al. 2005. Antimicrobial resistance and virulence genes of *E. coli* isolates from swine in Ontario.