



## Short Communication

Multidrug-resistant *Escherichia coli* harbouring *mcr-1* and *bla*<sub>CTX-M</sub> genes isolated from swine in ArgentinaDiego Faccone<sup>a,b</sup>, Fabiana A. Moredo<sup>c</sup>, Gabriela I. Giacoboni<sup>c</sup>, Ezequiel Albornoz<sup>a</sup>, Laura Alarcón<sup>d</sup>, Victorio F. Nuevas<sup>c</sup>, Alejandra Corso<sup>a,\*</sup><sup>a</sup> Servicio Antimicrobianos, Instituto Nacional de Enfermedades Infecciosas-ANLIS 'Dr Carlos G. Malbrán', Av. Velez Sarsfield 563 (C1282AFF), Ciudad Autónoma de Buenos Aires (CABA), Argentina<sup>b</sup> Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Godoy Cruz 2290 (C1425FQB), CABA, Argentina<sup>c</sup> Departamento de Microbiología, Facultad de Ciencias Veterinarias, UNLP, Calle 60 y 118 (CC296), CP 1900, La Plata, Buenos Aires Province, Argentina<sup>d</sup> Cátedra de Medicina Porcina, Facultad de Ciencias Veterinarias, Universidad Nacional de La Plata (FCV-UNLP), La Plata, Buenos Aires Province, Argentina

## ARTICLE INFO

## Article history:

Received 12 December 2018

Received in revised form 18 March 2019

Accepted 19 March 2019

Available online 27 March 2019

## Keywords:

*mcr-1**bla*<sub>CTX-M</sub>

ESBL

*Escherichia coli*

Swine

Argentina

## ABSTRACT

**Objectives:** Multidrug-resistant *Escherichia coli* isolates recovered from food-producing animals are a global public-health concern, especially those with transferable mechanisms of antimicrobial resistance such as extended-spectrum  $\beta$ -lactamase (ESBL) and *mcr-1* genes. Here we report for the first time *E. coli* recovered from diarrhoeic and healthy pigs harbouring *bla*<sub>CTX-M</sub> and/or *mcr-1* from Argentinean farms. **Methods:** During 2017, a total of 34 *E. coli* were recovered from 31 faecal samples from diarrhoeic piglets and healthy fattening pigs from five pig farms in three Argentinean provinces. Antimicrobial susceptibility was evaluated by agar diffusion and resistance genes were identified by PCR. Multiplex PCR was applied to screen for ST69, ST73, ST95 and ST131 clones. Genetic relationships were evaluated by *Xba*I-PFGE.

**Results:** A high diversity of resistance profiles was observed (20 profiles among 34 isolates), and 71% of isolates were multidrug-resistant. Resistance to third-generation cephalosporins (3GCs) was observed in 28 isolates and was associated with *bla*<sub>CTX-M</sub> (24), *bla*<sub>CMY</sub> (3) and *bla*<sub>PER-2</sub> (1) genes. *bla*<sub>CTX-M</sub> alleles were grouped by specific PCR as follow: 17 *bla*<sub>CTX-M-8/25</sub>; 4 *bla*<sub>CTX-M-1/15</sub>; 2 *bla*<sub>CTX-M-2</sub>; and 1 *bla*<sub>CTX-M-9/14</sub>. Twelve isolates were positive for *mcr-1*, of which six were also resistant to 3GCs and were positive for *bla*<sub>CTX-M-8/25</sub> (4), *bla*<sub>CTX-M-1/15</sub> (1) or *bla*<sub>CMY</sub> (1). High genetic diversity was observed, discriminating 29 profiles. One ST131 and two ST95 human-associated clones were detected.

**Conclusion:** Here we describe *E. coli* isolates recovered from diarrhoeic piglets and healthy fattening pigs harbouring ESBL and/or *mcr-1* genes. 3GC resistance was mainly associated with CTX-M, in particular with *bla*<sub>CTX-M-8/25</sub> alleles.

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## 1. Introduction

Antimicrobial use in food-producing animals can lead to the selection and dissemination of antimicrobial-resistant bacteria, which can then be transmitted to humans via food and other transmission routes [1]. Reports of multidrug-resistant (MDR) *Escherichia coli* isolates recovered from food-producing animals are a global public-health concern. In veterinary medicine, colistin and third-generation cephalosporins (3GCs) have been used both as prophylaxis and metaphylaxis [2,3]. Colistin has been widely used to prevent infection and as a growth promoter in food-producing

animals. In January 2019, use of colistin for veterinary purposes was banned in Argentina by the former Ministry of Agriculture. This measure included the preparation, distribution, import, use and possession of any formulation containing colistin and its salts (<http://servicios.infoleg.gob.ar/infolegInternet/anexos/315000-319999/318811/norma.htm>). This innovative regulation sought to preserve the use of colistin only for the treatment of human infections. Recently, a mobile colistin resistance gene (*mcr-1*) located on transferable plasmids has been reported in several bacterial species from animals, animal food products, humans and environmental samples [4]. Production of extended-spectrum  $\beta$ -lactamase (ESBL) enzymes, including the TEM-, SHV- and CTX-M-types, confers resistance to frequently used  $\beta$ -lactam antimicrobials, including 3GCs such as ceftriaxone, ceftazidime and ceftiofur [5]. The *bla*<sub>CTX-M</sub> family are the most widely reported ESBLs in

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## Funding

This work was supported by the regular federal budget of the Ministry of Health and Social Development of the Nation, Préstamo BID-PICT-2016-3154 from ANPCYT as well as grant 11/V251 from Universidad Nacional de La Plata (La Plata, Argentina).

## Competing interests

None declared.

## Ethical approval

Not required.

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