



REVISTA ARGENTINA DE MICROBIOLOGÍA

www.elsevier.es/ram



LETTER TO THE EDITOR

Plasmid-mediated colistin resistance in *Escherichia coli* recovered from healthy poultry

Resistencia a colistina mediada por plásmido en *Escherichia coli* recuperadas de aves de corral sanas

Dear Editor,

Several antibiotics have been massively used at sub-inhibitory concentrations as growth promoters for more than 6 decades³ to improve weight gain and therefore, to maximize feed conversion efficiency in animal production. This use is currently under close scrutiny, as it may be – and for sure is – selecting and collaborating for multi-drug resistant enteric bacteria.

As a service to poultry producers we have been monitoring the susceptibility to antimicrobial agents of indicator bacteria isolated from intensive farming systems to support choosing in advance the most effective promoters and to reduce selection pressure. *Escherichia coli* is one of the selected species considered markers for antimicrobial resistance evolution.

From 2013 to date, we have obtained 304 *E. coli* isolates recovered from 129 broiler chicken farms (only poultry growers) located in several provinces of Argentina (Buenos Aires, Córdoba, Entre Ríos, Rio Negro and Santa Fe). Isolates were recovered from fresh fecal samples collected randomly from clinically healthy chickens (aged 4–6 weeks). The analysis showed that almost half of them (49%) were found to be resistant to colistin, as determined by microdilution according to EUCAST breakpoint recommendations (version 6.0).

Colistin is considered a last-line antimicrobial agent retaining activity on multiresistant bacteria recovered from humans. Even when resistance was sporadically reported, it was assumed to be obtained by mutation of regulatory genes⁴. However, a gene conferring resistance to colistin was recently reported in conjugative plasmids². This gene (*mcr-1*) was most frequently found in *E. coli* but also in other species such as *Klebsiella pneumoniae* and *Salmonella*¹. Up to date, a large number of publications demonstrated its presence in isolates collected mainly from animal samples, and to a lesser extent, in samples of human origin.

After selecting approximately one third of our colistin-resistant *E. coli*, all of them were confirmed as *mcr-1* producers by PCR and full gene sequencing. In Argentina, the *mcr-1* determinant was previously reported in *E. coli* clinical strains isolated from inpatients⁵.

It should be noted that in our country, many producers have voluntarily stopped using colistin after the technical reports of these (our) results, even before the initial report of plasmid-borne transmission. In this regard, the World Health Organization recommends that the use of colistin be limited for the treatment of clinically affected animals. Moreover, in our country, official regulations governing the administration of these compounds in animal feed have already changed, including a gradual stepwise process with a final goal to completely ban their use by 2019.

References

1. Doumith M, Godbole G, Ashton P, Larkin L, Dallman T, Day M, Day M, Muller-Pebody B, Ellington MJ, de Pinna E, Johnson AP, Hopkins KL, Woodford N. Detection of the plasmid-mediated *mcr-1* gene conferring colistin resistance in human and food isolates of *Salmonella enterica* and *Escherichia coli* in England and Wales. *J Antimicrob Chemother.* 2016;71:2300–5.
2. Liu YY, Wang Y, Walsh TR, Yi LX, Zhang R, Spencer J, Doi Y, Tian G, Dong B, Huang X, Yu LF, Gu D, Ren H, Chen X, Lv L, He D, Zhou H, Liang Z, Liu JH, Shen J. Emergence of plasmid-mediated colistin resistance mechanism MCR-1 in animals and human beings in China: a microbiological and molecular biological study. *Lancet Infect Dis.* 2016;16:161–8.
3. Moore PR, Evenson A, Luckey T, McCoy E, Elvehjem C, Hart E. Use of sulfasuxidine, streptothricin, and streptomycin in nutritional studies with the chick. *J Biol Chem.* 1946;165:437–41.
4. Olaitan AO, Morand S, Rolain JM. Mechanisms of polymyxin resistance: acquired and intrinsic resistance in bacteria. *Front Microbiol.* 2014;5:643.
5. Rapoport M, Faccione D, Pasteran F, Ceriana P, Alborno E, Petroni A, MCR Group Corso A. First description of *mcr-1*-mediated colistin resistance in human infections caused by *Escherichia coli* in Latin America. *Antimicrob Agents Chemother.* 2016;60:4412–3.

Johana E. Dominguez^{a,c}, Roque A. Figueroa Espinosa^{b,c}, Leandro M. Redondo^{a,c}, Daniela Cejas^{b,c}, Gabriel O. Gutkind^{b,c,*}, Pablo A. Chacana^a, José A. Di Conza^{b,c}, Mariano E. Fernández-Miyakawa^{a,c}

<http://dx.doi.org/10.1016/j.ram.2017.02.001>

0325-7541/© 2017 Asociación Argentina de Microbiología. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article in press as: Dominguez JE, et al. Plasmid-mediated colistin resistance in *Escherichia coli* recovered from healthy poultry. *Rev Argent Microbiol.* 2017. <http://dx.doi.org/10.1016/j.ram.2017.02.001>

^a *Instituto Nacional de Tecnología Agropecuaria, Centro Nacional de Investigaciones Agropecuarias, Instituto de Patobiología, Las Cabañas y los Reseros s/n, Casilla de Correo 25, 1712, Castelar, Provincia de Buenos Aires, Buenos Aires, Argentina*

^b *Universidad de Buenos Aires, Facultad de Farmacia y Bioquímica, Junín 954, C1113AAD, Ciudad Autónoma de Buenos Aires, Buenos Aires, Argentina*

^c *Consejo Nacional de Investigaciones Científicas y Tecnológicas, Godoy Cruz 2290, C1425FQB, Ciudad Autónoma de Buenos Aires, Buenos Aires, Argentina*

* Corresponding author.

E-mail address: ggutkind@ffyb.uba.ar (G.O. Gutkind).