

Authors' reply: *Escherichia coli* harbouring *mcr-1* gene isolated from poultry not exposed to polymyxins in Brazil

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To the editor: The foregoing letter by Lentz et al. examined the occurrence of the *mcr-1* gene in *Escherichia coli* isolates recovered from chicken cloacal swabs collected between August and October of 2015, from a poultry slaughterhouse in southern Brazil [1], providing valuable additional data on the epidemiology of this novel gene. Of 343 animals screened, 10 (3%) different chickens belonging to three flocks from three different breeders were found with *mcr-1* positive *E. coli* isolates [1]. None of these chickens had been reportedly exposed to polymyxins (as growth promoter) [1]. The authors therefore considered their findings as contradicting the plausible hypothesis that the emergence of the *mcr-1* gene is linked to the use of polymyxins in animal feed in Brazilian livestock [2], suggesting that others compounds or factors may also be involved in the selection of this gene.

With regard to this interpretation however, we put forward several points that might be taken into account. Indeed, the investigation by Lentz et al. was conducted as a prospective and short three-month period study, whereby the use of antibiotics other than polymyxins to promote growth might have been part of a transitory change in local agricultural practices, which is not reflected in the whole country. Furthermore, the chickens were only tested for *mcr-1*-harbouring bacteria after 35 days of life, so it is not known if they already had acquired *E. coli* with this gene at a younger stage. For example, if the *mcr-1* gene had been detected already at one day of age, this could have suggested vertical transmission from breeder flocks, as well as the capacity of *mcr-1* positive strains to survive the hatchery process[3]. In addition, retrospective use of colistin, in the studied breeder flocks, was not raised. So, although the authors state that polymyxins were not employed as a growth promoters throughout the study period, the possible use of colistin in the past

years, along the poultry production chain, cannot be ruled out. This could explain the polymyxin susceptibility (i.e. polymyxin B minimum inhibitory concentration: MIC_≤2 mg/L) exhibited by *mcr-1* positive *E. coli* strains found in the study [1]. In fact, the persistence of a resistance gene may be related to the stability of the plasmid in its host, where the expression of resistance is normally silent until it is induced by antibiotic pressure [4,5]. Moreover, antibiotic-resistant bacteria may also be acquired from external sources, and potentially transferred to current animals, from animals kept at the same location during the previous farming cycle ('carry-over') [3]. In brief, we believe that studies conducted to evaluate the presence of *E. coli* harbouring *mcr-1* gene in poultry not exposed to polymyxins should be preferably addressed in experimental farm settings where antimicrobial exposure is well controlled.

Regardless, valuable information in the letter by Lentz et al. was the identification of more *mcr-1* positive *E. coli* in southern Brazil, which is worrisome, since strains of *E. coli* carrying *mcr-1* have been previously identified in food-producing animals from Minas Gerais, São Paulo, Paraná and Santa Catarina states [2]. Recently, we have also identified the first colistin-resistant *mcr-1* positive *E. coli* isolate from a human infection in Rio Grande do Norte State, north-eastern Brazil (data not shown; GenBank accession number: CP015977). Thus, although data on MCR-1 are currently few, there is supportive evidence that *E. coli* strains carrying *mcr-1* genes are widespread in Brazil in both humans and animals. Currently, to optimise the performance of farming, use of colistin sulfate is allowed within the levels recommended by the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA) in diets of food-producing animals [6].

In summary, these results should encourage greater restrictions of colistin in farming systems. Furthermore, the emergence of *mcr-1* positive *E. coli* isolates and their potential spread require very close monitoring and surveillance.

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Conflict of interest

None declared.

Authors' contributions

MRF, QM, FE and NL wrote the letter.

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