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Colistin-resistant *Escherichia coli* in calves and adult cattle from Portuguese dairy farms

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Abstract

Background: Antimicrobial resistance poses a pressing and significant challenge, driven by the intricate interplay among animals, humans, and the environment [1]. *Escherichia coli*, a commensal within animal and human gut microbiota, stands as one of the most ubiquitous bacteria. With a multitude of resistance genes, many *E. coli* strains exhibit a multidrug-resistant phenotype, diminishing the effectiveness of available antimicrobial agents [2] and becoming a major challenge in human therapeutics. Resistance to colistin, which is currently only used in humans as a last resort against multidrug-resistant bacteria [2,3], is unknown in fecal *E. coli* from Portuguese bovine. **Objective:** To detect *E. coli* carrying mobilized-colistin resistance (*mcr*) genes isolated from Portuguese dairy cattle. **Methods:** Fecal pools divided by age groups (8 adult or 8 calf samples) were collected from Holstein-Friesian dairy cattle produced on 8 farms in the Northern region (Braga and Porto), with a history of antibiotic administration in the last 3 months. Each farm comprised 2 pools totaling 128 samples (8 farms´16 pools). Samples were plated onto MacConkey agar (with or without 3 µg/mL colistin). Typical colonies from each plate were identified by MALDI-TOF MS and screened for *mcr*-1, *mcr*-2 and *mcr*-3 genes by PCR [3]. **Results:** Representative *E. coli* (*n*=26) identified in 15/16 pools (7 adults and 8 calves) were selected for *mcr* screening. The *mcr*-1 gene was detected in 46% (*n*=12) of the *E. coli* isolates from 11 positive pools (6 isolates from 6 calf pools and 6 isolates from 5 adult animal pools). In 5 farms, both age groups analyzed were positive. No *mcr*-2 and *mcr*-3 were identified. **Conclusions:** This study represents the first detection of the *mcr*-1 colistin-resistance gene in *E. coli* from dairy cattle, including calves, in Portugal. These highlight the potential public health risk posed by livestock as a reservoir and source of *mcr*-1genes able to reach humans through the food chain or the environment.

Keywords: antimicrobial resistance; bovine; *Escherichia coli*; *mcr* genes; Holstein-Friesian

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