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### Master Thesis Defense

#### Entitled

PLASMID MEDIATED COLISTIN RESISTANCE IN ENTEROBACTERIACEAE ISOLATED FROM FECES OF BROILER CHICKEN IN THE UNITED ARAB EMIRATES

#### by

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#### Abstract

Although human infections with colistin resistant *Mcr*-producing *Enterobacteriaceae* have been reported from the Arabian Peninsula, the presence of *mcr* gene in strains of animal origin has not been studied. Ten composite fecal samples were collected in each of four geographically distant poultry farms in Abu Dhabi Emirate. Ten colonies from McConkey agar containing 1 mg/L colistin from each sample were PCR-screened for *mcr-1*, *mcr-2*, *mcr-3*, *mcr-4*, *mcr-5*. Of the positive ones, one isolate representing each distinct plasmid profiles were selected for susceptibility testing and for whole genome sequencing (WGS). Transfer of the *mcr-1* gene into *Escherichia coli* K12 was attempted. Plasmids were first compared by restriction fragment length polymorphism (RFLP). Representatives of plasmids with distinct RFLP profile were sequenced and their incompatibility type was determined. *mcr-1* positive colonies were identified in 36 of the 40 samples. The 40 isolates selected were resistant to ampicillin and colistin (MIC range 4->256 mg/L) with variable resistance to 3rd generation cephalosporins, tetracyclines, quinolones, co-trimoxazole and aminoglycosides. Thirty-five *Escherichia coli*, two *Escherichia albertii*, two *Klebsiella pneumoniae* and one *Salmonella* Minnesota were identified based on their whole genomes. They represented a remarkable variety of sequence types and in case of *E. coli* core genome multi-locus sequence types. Beyond *mcr-1*, all strains carried at least one beta-lactamase, and aminoglycoside, tetracycline, and co-trimoxazole resistance genes, seven of them ESBL genes and one *bla*<sub>CMY-2</sub>. Transfer of the *mcr*-plasmid was successful in case of 6 IncHI2, 26 IncI2 and 4 IncX4 plasmids, respectively. Co-transfer of ampicillin, chloramphenicol and tetracycline resistance with the *mcr-1* gene was observed in case of the IncHI2 plasmids. From the four chicken farms multiple species of *Enterobacteriaceae* exhibiting a variety of MLST and cgMLST patterns, carrying the *mcr-1* gene on plasmids of three different incompatibility types were isolated. Similar strains and similar plasmids were present in multiple farms. These data show that the farms are heavily infested with *mcr-1* carrying strains with the possibility to transfer it, via the food chain, to humans.

**Keywords:** Mobile colistin resistance, poultry, United Arab Emirates.