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AQUACULTURES AS RESERVOIRS OF PLASMID-MEDIATED QUINOLONE RESISTANCE GENES

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Quinolones are critical antibiotics (AB) for the treatment of human infections. Plasmid-mediated quinolone resistance genes (PMQR) were described in aquatic settings but the input of aquacultures for their spread in nature remains scarce. We aimed to study the contribution of trout farms to the spread of bacteria carrying PMQR genes to aquatic environments downstream of the production systems.

Samples were collected from water/sediments upstream (n=13) and downstream (n=13) of farms, water/sediments from juvenile/adult fish ponds (n=15) and feed (n=6) from 2 Portuguese trout aquacultures (TR-A/TR-B; winter/summer; 2010–2012). They were plated in MacConkey with ciprofloxacin and *Aeromonas* Agar after enrichment. Genes coding resistance to fluoroquinolones [*qnr*, *qepA*, *aac(6')-Ib-cr*, *oqxAB*] and other AB were searched by PCR/sequencing. AB resistance was studied by agar diffusion/Etest (CLSI/EUCAST). Species were identified by ID32GN/16SrDNA sequencing. Clonality (MLST; *Escherichia coli*), characterization of plasmid (PL) and integron backbones (PCR, rep-PCR and/or sequencing), conjugation assays and genomic location (I-Ceul/S1 PFGE hybridization) were done.

PMQR genes were found in 9% (n=14/160) of the isolates: *Aeromonas* spp (3; upstream/downstream river water/adult ponds water/TR-A), *E. coli* (6; ST423-CC23, ST641, ST661, ST1049, ST2739; upstream/downstream river water/TR-A, juvenile/adult ponds water or sediment/TR-B), *Klebsiella* spp (2; downstream river sediment/TR-A, feed/TR-B) and *Citrobacter freundii* complex (3; sediment from adult pond/TR output/TR-B; feed/TR-A) with MIC to ciprofloxacin (0.19–1 mg/L) above ECOFF for *Enterobacteriaceae*. The *qnrS1* was found in an untypable (UN) PL of *E. coli* (2); *qnrS2* in UN PL of *Aeromonas*; *qnrS3* in PL (2 UN/1 IncN) of *E. coli* and in an IncN PL of a *C. freundii* complex. The *oqxAB* in IncN-F hybrid or UN PL of 2 MDR *Klebsiella* spp and *aac(6')-Ib-cr* in IncU PL in *Aeromonas*. Different *qnrB* alleles, including a new variant, were chromosome located in *E. coli* (1), *Klebsiella* spp (1) and *C. freundii* complex (1). Transferable PL were found only in *E. coli* carrying *qnrS1* (2) or *qnrS3* (2). Most strains carried other AB resistance genes, class 1 integrons and/or IS26.

The detection of different PMQR genes in different species and samples in both TR strongly suggests that this ecological niche might constitute a reservoir/vehicle for antibiotic resistance genes of relevance for human and animal health.