1414S | Spread of arsenic tolerance genes among Salmonella enterica serotype 4,[5],12:i-: major European clone

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Salmonella is a major foodborne zoonotic pathogen, with metals (copper-Cu/silver-Ag), currently used in the animal-production setting, possibly contributing to the emergence of multidrug-resistant (MDR) serotypes/clones, such as S. 4,[5],12:i-:(PMID-25816978). However, the selection of such bacteria by arsenic due to the environmental contamination by anthropogenic activities (e.g. use of coccidiostatics/pesticides or waste in farms) remains poorly explored. Our objective was to study the occurrence of arsenic tolerance (AsT) genes, their genetic location and tolerance phenotypes in major S. 4,[5],12:i-: clones from different sources. We include 82 S. 4,[5],12:i-: isolates (Portugal: 2002-2015 and Austria: 2013-2014) recovered from humans (n=50), food (n=17), food-animal production (n=8), pets (n=3) and aquatic environment (n=4). They are representative of the major clones (PT-European/Spanish/Southern-European; AU-European) and present MDR (n=73/82-89%) profiles and Cu/Ag tolerance (n=67/82-82%). Screening of AsT genes, arsB and acr3 (both coding for arsenical efflux pumps), was done by PCR/sequencing. MICNa2HASO4 were determined in aerobic and anaerobic atmospheres by agar dilution method. Genomic location of AsT was assessed by I-Ceu/S1-PFGE-hybridization.

A high occurrence of AsT genes (only arsB) was found in isolates from Portugal (36/63-57%) and Austria (18/19-95%), with all belonging to the emergent pig-associated S. 4,[5],12:i-: European clone. Isolates carrying arsB showed higher MICNa2HASO4 (MIC50=>128mM) than those without these genes (MIC50=1-2mM) in both aerobic/anaerobic conditions. The arsB was chromosomally located, together with Cu/Ag tolerance genes and antibiotic resistance genes. The high occurrence of arsB genes conferring high MICs to Na2HASO4, among MDR S. 4,[5],12:i-: European clone suggests that AsT, along with tolerance to other metals, might have contributed to their successful expansion, particularly in food-animal farm environments.