Abundance and diversity of the faecal resistome in slaughter pigs and broilers in nine European countries

Antimicrobial resistance (AMR) in bacteria and associated human morbidity and mortality is increasing. The use of antimicrobials in livestock selects for AMR that can subsequently be transferred to humans. This flow of AMR between reservoirs demands surveillance in livestock and in humans. We quantified and characterized the acquired resistance gene pools (resistomes) of 181 pig and 178 poultry farms from nine European countries, sequencing more than 5,000 Gb of DNA using shotgun metagenomics. We quantified acquired AMR using the ResFinder database and a second database constructed for this study, consisting of AMR genes identified through screening environmental DNA. The pig and poultry resistomes were very different in abundance and composition. There was a significant country effect on the resistomes, more so in pigs than in poultry. We found higher AMR loads in pigs, whereas poultry resistomes were more diverse. We detected several recently described, critical AMR genes, including mcr-1 and optrA, the abundance of which differed both between host species and between countries. We found that the total acquired AMR level was associated with the overall country-specific antimicrobial usage in livestock and that countries with comparable usage patterns had similar resistomes. However, functionally determined AMR genes were not associated with total drug use.

General information
State: Published
Organisations: Research group for Genomic Epidemiology, National Food Institute, Department of Bio and Health Informatics, Genomic Epidemiology, Utrecht University, Wageningen University & Research, University of Geneva, Complutense University, ANSES - French Agency for Food, Environmental and Occupational Health & Safety, Istituto Zooprofylattico Sperimentale del Lazio e della Toscana, Ghent University, University of Veterinary Medicine Hannover, Foundation, National Veterinary Research Institute, National Diagnostic Research Veterinary Institute, SAFOSO AG, Intomics A/S, Technical University of Denmark
Pages: 898-908
Publication date: 1 Aug 2018
Peer-reviewed: Yes

Publication information
Journal: Nature Microbiology
Volume: 3
Issue number: 8
ISSN (Print): 2058-5276
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 7.82 SJR 7.139 SNIP 3.095
Web of Science (2017): Impact factor 14.174
Web of Science (2017): Indexed yes
Web of Science (2016): Impact factor
Web of Science (2016): Indexed yes
Original language: English
DOIs:
10.1038/s41564-018-0192-9
Source: Scopus
Source-ID: 85051077665
Research output: Research - peer-review > Journal article – Annual report year: 2018