

International Conference on **Food Safety & Regulatory**
&
3rd International Conference on
Water Microbiology, Water Sustainability and Reuse Technologies
December 03-04, 2018 | Chicago, USA

Wastewater from a pig slaughterhouse as a reservoir for clinically relevant antibiotic-resistant pathogens and their dissemination into surface water

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Background and objectives: Slaughterhouse wastewater is considered a hotspot for antibiotic-resistant pathogens (ARPs). The aim was to investigate the occurrence of selected clinically relevant ARPs in wastewater from a pig slaughterhouse and its municipal wastewater treatment plant (WWTP) and to examine their emergence after the treatment process in the municipal WWTP.

Methods: Wastewater samples (n=38) were taken along the production chain inside a pig slaughterhouse in Germany with a slaughtering capacity of 11,000 pigs/day. Its municipal WWTP was sampled as well (n=12). Samples were screened for the presence of ARP using CHROM agar selective media. The final identification was done by MALDI-TOF MS and resistance was confirmed by determining of MICs using the ID/AST testing system. The resistant strains were further characterized by different molecular typing approaches. The colistin-resistant strains were screened for *mcr-1/mcr-2/mcr-3/mcr-4*.

Results: All wastewater samples including the outflow and the preflood of the municipal WWTP were positive for ARPs. Their occurrence at the sampling points and species distribution was done. 15.7% of the isolated strains from the slaughterhouse (n=166) were multidrug-resistant (MDR) and 3.0% were colistin-resistant. The percentage of MDR strains from the municipal WWTP (n=28) was 96.5%; of these, 10.7% were colistin-resistant. The colistin-resistant isolates (n=8) were *mcr*-negative. The prevalence of carbapenem-resistant strains was low at 1.2% and 3.4% among the strains from the slaughterhouse and the municipal WWTP, respectively. The abundance of extraintestinal pathogenic *E. coli* was low at 7.1%. The tested MRSA strains from the slaughterhouse (n=57) were known livestock-associated types.

Conclusions: Wastewater from the investigated pig slaughterhouse is a reservoir for clinically relevant ARPs. Despite the elimination of bacterial load in the municipal WWTP, they could still be found in its outflow and preflood. This could pose a threat to human health and needs to be further investigated.

Biography

Mykhailo Savin has studied Food Technology at the University of Bonn and got his MSc degree in 2016. From 2016 on, he has been working as a PhD student at the Institute of Animal Sciences at the University of Bonn. He is involved in the BMBF (Federal Ministry of Education and Research)-joint project "HyReKa", where he investigates the occurrence and dissemination of clinically relevant antibiotic-resistant pathogens from poultry and pig slaughterhouses via wastewater and sewage water treatment plants into surface waters. Based on these results, recommendations for the prevention of dissemination should be formulated.

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