

ARAE 2017 - Brief Report

The 7th Symposium on Antimicrobial Resistance in Animals and the Environment (ARAE) took place from June 26 to 28 2017 in Braunschweig, Germany. The ARAE Symposium is an international, interdisciplinary event for scientists from the research areas of microbiology, animal and environmental hygiene, epidemiology and molecular biology dealing with zoonoses and resistance research.

During the three days, 161 participants from 23 countries of 6 continents discussed recent developments in antimicrobial resistance (AMR), one of the most important One Health challenges in the world.

Participants of the ARAE 2017 were given a warm welcome by the organisers and the mayor of Braunschweig, Dr. Helmut Blöcker, at the evening of June 25 in the old town hall (Altstadtrathaus). This historical location is a remarkable example of Gothic architecture in the city of Braunschweig and provided a perfect atmospheric and impressive frame for the opening of the meeting.

The scientific programme was subdivided into ten oral and two poster sessions.

In the first session "Monitoring and epidemiology of AMR", Prof. Séamus Fanning from the University College Dublin, Ireland, gave an insight into the characteristics of *Salmonella* isolates from China. In his keynote speech, he presented studies that identified and characterized multidrug-resistant *Salmonella enterica* subsp. *enterica* serovars from the food chain, including the characterization of a *bla*_{NDM-1}-carrying multiresistance plasmid from a *S. Indiana* isolate of poultry origin. The following presentations, given by speakers from France and Germany, focused on the occurrence and characteristics of mobile, mainly plasmid-borne (fluoro)quinolone or linezolid resistance genes from *Proteae* and enterococci, respectively.

In his keynote lecture opening the session "AMR in the environment", Prof. Thomas Berendonk, Technical University of Dresden, Germany, showed that when comparing in- and outflow of wastewater treatment plants no significant reduction in the relative abundances of key resistance genes was observed. However, a change in the bacterial community appeared. Reports on the frequent occurrence of antibiotic-resistant bacteria in wastewater from Ireland and The Netherlands completed this session.

René Hendriksen, PhD, from the Technical University of Denmark spoke about AMR genes in sewage from airplanes, urban slums and wastewater treatment plants. As keynote lecturer of the session on "Novel diagnostic tools", his focus was on the use of metagenomic analyses to improve the surveillance of AMR in large human and animal populations. These methods can be applied to characterise the entity of genetic material obtained directly from a specimen. Another sequence-based approach, developed by working groups from the UK, was also presented in this session. The so called ARIBA (Antimicrobial Resistance Identification By Assembly) uses a combined mapping/alignment and targeted local assembly approach to identify AMR genes and variants thereof efficiently and accurately from Illumina paired sequencing reads. In addition, new methods for susceptibility testing of *Haemophilus parasuis* and biocide susceptibility testing were introduced by two speakers from Germany.

In the session on the "Use of antimicrobial agents", an overview on comparability of data from monitoring systems and the consequences of differences in the calculation of variables describing the use of antibiotics in food-producing animals was given in talks from Germany and Italy. Two speakers from Belgium and the USA discussed the association between veterinary antibiotic use and resistance in commensal *E. coli* from livestock. In summary, the continuous decrease in antibiotic use appears to have a positive effect on the levels of resistance. However, it is important to differentiate between antibiotics, bacterial species and animal species. At the end of this session, results on AMR in Norwegian red foxes and their role as indicators of AMR in the environment were presented.

Two sessions dealt with AmpC-, carbapenemase- and ESBL-producing *Enterobacteriaceae*. Speakers from The Netherlands, Germany, France, New Zealand, USA and Canada presented data on prevalence and characteristics of these bacteria isolated from livestock, horses, companion animals, seal pups, or food. A research group from the Netherlands studied the occurrence of ESBL- and AmpC-producing *E. coli* in calves. They found a prevalence of 24% in calves aged three to four days but this prevalence strongly decreased after day five. The authors of a longitudinal study from The Netherlands concluded, that the dissemination of ESBL-producing *E. coli* on the investigated broiler farm was not due to the spread of one specific *E. coli* clone, but due to horizontal transfer of a specific plasmid carrying certain ESBL-genes. This finding was in line with the results of other studies presented at the conference.

The topic "Colistin resistance" was introduced by Associate Professor Dr. Laurent Poirel, University of Fribourg, Switzerland. He explained that the impact of the use of polymyxins in agriculture was not seriously taken into account as long as there was no critical need for colistin in human medicine. This situation has changed due to rapid emergence of multidrug-resistant gram negatives in human medicine. Therefore, colistin is now one of the last resort antibiotics to treat human infections. Poirel pointed out difficulties in the determination of polymyxin susceptibility. The talks in this session and the following session reported on occurrence and characteristics of *mcr*-gene carrying strains from China and Europe.

Results on characteristics of methicillin-resistant *Staphylococcus aureus* (MRSA) from a German research consortium were presented in the "MRSA" session. Presence of MRSA in wild hedgehogs from Sweden was reported. A speaker from Denmark explained that although farmers are often persistent carriers of MRSA, visitors of livestock farms lost the livestock-associated MRSA strains in their nose soon after the farm visits. Moreover, that the nasal microbiome of farmers and visitors differs.

The session "Novel and alternative Approaches in Fighting AMR" started with a keynote lecture given by Prof. Scott McEwen, Ontario Veterinary College, Canada. He explained the criteria which are used from the WHO to categorise antimicrobials with respect to importance for human health. These criteria are also used to develop risk management strategies for antimicrobial use in food-producing animals. A speaker from New Zealand showed that a novel veterinary intervention programme could reduce the antimicrobial usage on dairy farms. Cationic antimicrobial peptides (AMPs) were introduced by a speaker from Germany and are promising candidates for future alternative treatment strategies of mastitis in dairy cattle

The scientific programme was concluded by a keynote lecture held by Engeline van Duijkeren, PhD, National Institute for Public Health and the Environment, The Netherlands. She gave an overview on

recent research on the epidemiology of ESBL-producing *E. coli* among animals, humans and the environment and pointed out the necessity of a One Health approach to fight AMR.

During the two poster sessions, 89 posters were presented and discussed. In addition, 15 selected posters were introduced within three-minute speed presentations in the lecture hall. A best poster award, sponsored by Veterinary Sciences, was handed over at the last day of the conference by Kristina Kadlec, PhD and Prof. Dr. Patrick Butaye, Ross University School of Veterinary Medicine, Saint Kitts and Nevis, Editor-in-Chief of "Veterinary Sciences". The poster from Cindy Dierikx showing that eating meat does not increase the risk to carry ESBL-producing *E. coli/Klebsiella pneumoniae* convinced the jury and was considered as the best poster.

In the evening of the second conference day, ARAE participants enjoyed a German barbecue in sunny weather at the International Museum of Wind and Water Mills in Gifhorn, and could stroll around between ancient mills and buildings in the outdoor museum.

ARAE 2017 proved again that this biannual conference is one of the most indicated scientific meetings in research on AMR. On behalf of the organising committee, Prof. Dr. Stefan Schwarz and Prof. Dr. Lothar Kreienbrock closed the successful meeting on June 28 with special thanks to all helping hands and for the financial support of the meeting by Zoetis, bioMérieux, Förderverein für angewandte Epidemiologie und Ökologie e.V. (FEP), Boehringer Ingelheim, Dechra and IDEXX Laboratories.

A special issue of the journal Veterinary Microbiology will give participants the chance to publish their results presented at ARAE 2017. The next ARAE will take place from July 1 to 3, 2019 in Tours, France.