

# Letters

## ANTIMICROBIALS

### Use of antibiotics in animals and people

DAVID Burch (*VR*, November 28, 2015, vol 177, pp 549-550) questions whether the transfer of resistance plasmids from farm animal to human *Escherichia coli* is of any 'real significance' and asks if the bacteria which receive the resistance genes cause disease in people.

Yes – some *E coli* causing infections in humans have cephalosporin-resistance plasmids which are virtually identical to plasmids carried by genetically unrelated farm animal *E coli*.

In our response (*VR*, November 7, 2015, vol 177, pp 468-469) to his earlier letter (*VR*, September 19, 2015, vol 177, pp 292-293), we cited Dutch research which used whole-genome sequencing methods to show that genetically unrelated *E coli* from human and animal sources carried apparently identical or nearly identical plasmids (IncI1- and IncK types) conferring cephalosporin resistance (de Been and others 2014). Most of the human isolates were from clinical cases and included blood, urine and pulmonary infections.

Similarly, most of the *E coli* from humans included in the second study we cited (Smith and others 2015) were from urinary tract infections. A third study, from the UK, has also found cephalosporin-resistance plasmids (IncK types) in human clinical *E coli*, which were 'highly related' to a plasmid initially found in a bovine strain. None of the human *E coli* was related to the original bovine *E coli* (Dhanji and others 2012).

Mr Burch suggests that if transmission of plasmids from farm animal *E coli* to *E coli* involved in human clinical cases is occurring, then the plasmids would be expected to be genetically identical. However, the farm animal *E coli* and resistance plasmids were taken from animals or retail meat that had not yet been consumed by humans, and were therefore not directly epidemiologically related to any of the human clinical isolates with which they were being compared. Since plasmids can mutate, it is not necessarily to be expected that they would be completely identical. Furthermore, de Been and others (2014) did find that the core genomes of certain ESBL plasmids from humans, pigs and poultry *E coli* were identical, involving no single nucleotide polymorphisms over almost 50 kbp.

The potential significance to human health of the horizontal spread of resistance genes and plasmids, which Mr Burch is

questioning, is further illustrated by the recently detected plasmid-mediated colistin resistance in China in bacteria from farm animals, retail meat and human clinical infections (*VR*, December 5, 2015, vol 177, pp 556). The higher proportion of positive samples found in the farm animals and retail meat led the researchers to conclude that it is likely that *mcr-1*-mediated colistin resistance originated in farm animals and subsequently spread to people (Liu and others 2015).

Since the publication of the research from China, the *mcr-1* gene has already been found in an *E coli* from a blood infection in a person in Denmark earlier in 2015 and in five *E coli* isolates from poultry imported into Denmark from Germany (Hasman and others 2015). Analysis by multilocus sequence typing showed no close clonal relationship between any of the six isolates, which again suggests that a resistance plasmid may be spreading between different strains.

Mr Burch's first letter was a response to an editorial by J. W. Scannell and A. Bruce (*VR*, August 15, 2015, vol 177, pp 168-170) which suggested that the O'Neill Review, the independent Review on Antimicrobial Resistance established by the Prime Minister, would soon be making recommendations which were likely to require the veterinary profession to go beyond responsible use guidelines and to use fewer antibiotics.

The O'Neill review's report on antimicrobials in agriculture and the environment has now been published, and concluded that the evidence of a link between the use of antibiotics in animals and resistant infections in humans is 'compelling' (Review on Antimicrobial Resistance 2015). In a literature review discussed in the report, 72 per cent of studies by university scientists found a link between farm antibiotic use and resistance in human medicine, whereas just 5 per cent found no link. The report's authors say the evidence warrants a significant global reduction in farm antibiotic use.

We welcome the fact that many individual veterinarians are already making genuine efforts in this area and hope that they will go further in efforts to provide science-based advice to livestock keepers on how they can minimise the need for antimicrobials by making changes to management systems.

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