Going Dutch on antibiotic resistance

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Reducing antibiotic use in animal husbandry is essential to preventing the spread of antibiotic resistance, argues Dr Danielle van Dalen.

The significance of the use of antibiotics in animal husbandry in the emergence and spread of antibiotic resistance in humans is a matter of ongoing controversy.

Veterinarians and veterinary medicine producing industries also within or vis-a-vis the European Commission and Member State institutions blame the human health side for the rapidly growing antibacterial resistance threat.

A lack of clarity by hospitals and other medical services has created an absence of their insights in the debate.
Nurses were only recently recognised as a relevant source. So mostly independent researchers point at scientific evidence of antibiotics in husbandry as a major cause of hundreds of thousands of Antimicrobial Resistance (AMR) deaths.

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The subtherapeutic application of antibiotics for growth promotion and disease prevention in farmed animals can undoubtedly lead to the selection of antibiotic-resistant strains in livestock. However, whether this has an impact on the levels of resistance in human clinical cases is still subject to debate.

Extended Spectrum Beta Lactamase (ESBL)-producing bacteria have emerged as a global public health threat, with the detection of ESBL-producing bacteria in humans and animals showing a worrying increase in recent years.

The frequent isolation of ESBL-producing bacteria from human, animal and environmental reservoirs led the Dutch research consortium ESBLAT, part of the 1health4food programme, to carry out an in-depth study into the transmission of ESBL genes between these different reservoirs, particularly between livestock and humans.

By studying the similarities between ESBL encoding genes in the bacteria isolated from animals, humans and the environment, the ESBLAT consortium concluded that the largest transmission route is indeed human to human.

However, it is important to note that transmission from animal to human can still occur: farmers had a 6-fold higher chance of carrying livestock-type ESBL genes.

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The strong resemblance between the ESBL genes found in the bacteria in farmers to that of the bacteria in their own livestock suggests that contact with livestock is the most likely transmission route. In addition, the ESBLAT study also demonstrated that the transmission of ESBLs from meat to humans can occur, in particular from bovine meat which is frequently eaten raw.

These findings suggest that whilst the most important measures to prevent the spread of ESBL-producing bacteria in humans are antibiotic stewardship and infection-control measures in hospitals, the transfer of ESBLs from the livestock reservoir to humans should not be neglected either.
By implementing a series of effective policies, the Netherlands was able to reduce its antibiotics usage in animal husbandry by an astounding 64.5% between 2009 and 2016.

Responding to concerns about methicillin-resistant Staphylococcus aureus (MRSA) and ESBLs in food-animals, a government taskforce on Antimicrobial Resistance in Food Animals was set up in 2008 to establish appropriate goals and actions.

To achieve the ambitious reduction target of 50% by 2013, multiple initiatives were taken including making antibiotic use on all farms transparent and implementing bans on the preventative use of antibiotics in livestock production and the use of any new antibacterial drug in animals.

Due to the success of these initiatives, the 50% reduction was in fact met a year early in 2012, prompting the renewal of this target to 70% reduction for total livestock production. Interestingly, analysis of the level of antimicrobial resistance in commensal E. coli in animals shows that the reduction in the use of antimicrobials was accompanied by a decrease in resistance levels for multiple antibiotics in E. coli isolated from a variety of livestock animals.

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The reduction in use of antibiotics was evidently an effective measure in reducing antibiotic resistance. Moreover, fears of farmers that reduced use of antibiotics could lead to less profitability proved incorrect.

While the ESBLAT consortium concluded that there was a low risk of transmission of ESBL-producing bacteria from livestock or meat to humans, this research only considered the Netherlands - a country with dramatically reduced antibiotic use in animal husbandry.

In other countries with much higher antibiotic use such as Italy, France and the UK, high transmission of ESBL genes from poultry to humans via the food chain has been reported. The higher the use of antibiotics, the greater the selective pressure on the bacteria to develop resistance and the bigger the chance of transmission of ESBL-producing bacteria from animals to humans.

The rest of Europe must seriously consider following the Dutch example if we are going to stand a chance at preventing the spread of antibiotic resistance.

About the author

Dr Danielle van Dalen is a former Chair of the Association of Manufacturers and Formulators of Enzyme Products (AMFEP) and a senior advisor for the PA International Foundation

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