Critical review of AMR risks arising as a consequence of using biocides and certain heavy metals in food animal production: Lay Summary

Antimicrobial resistance (AMR) is the resistance of a microorganism to an antimicrobial agent (a substance that kills or stops the growth of microorganisms) that was originally effective for treatment of infections caused by it. As a result standard antimicrobial drug treatments may become ineffective, lead to infections persisting, increasing the risk of spread to others, and negative clinical outcomes. AMR is a major public health issue worldwide and it is estimated that unless action is taken to tackle AMR, the global impact of AMR could be 10 million deaths annually from drug-resistant infections by 2050 and cost up to US $100 trillion in terms of cumulative lost global production (O'Neill, 2016). Addressing the public health threat posed by AMR is a national strategic priority for the UK and led to the Government publishing both a 20-year vision of AMR and a 5-year (2019 to 2024) AMR National Action Plan (NAP), which sets out actions to slow the development and spread of AMR. Intensive food animal production plays an important role in the development and spread of AMR and is one of many routes by which consumers can be exposed to antimicrobial-resistant bacteria. This review was carried out to help increase our understanding of whether, and to what extent, the use of biocides (disinfectants and sanitisers) and heavy metals (used in feed and other uses) in animal production leads to the development and spread of AMR within the food chain (a subject highlighted in the NAP). Whether this could potentially lead to greater consumer exposure to antimicrobial-resistant bacteria present in our food, either directly through consumption of foods derived from animals that have undergone treatment (for example from the use of heavy metals in animal feed) or indirectly (for example from exposure of crops to contaminated soil or ground water) is not known.

 Focused searching of three literature databases (Web of Science, Scopus, and MEDLINE) was undertaken, supplemented by additional records identified through other sources. Due to the range of publications identified and different laboratory methodologies used in these studies no statistical analysis was possible, so instead, a narrative approach was taken to their review and to the review of supplementary materials.

We conclude that there is published evidence that the release of chemicals like biocides (in particular disinfectants) and/or heavy metals from food animal production have the potential to contribute to the selection, emergence, and spread of AMR (as bacteria or genes) that could be acquired by consumers, and that this could present a potential risk to the consumer as a result. The published evidence is sparse and there are significant knowledge gaps (as detailed in this report). Currently there are insufficient data for a comprehensive and quantitative assessment of risk, and a need for focussed in-field studies (as detailed in this report) to be carried out to fill these knowledge gaps and confirm whether there is an actual risk.