The Royal College of Pathologists
Pathology: the science behind the cure

Antimicrobial resistance and animal health

A position statement from the Royal College of Pathologists

What is antimicrobial resistance?

Antimicrobial resistance (AMR) occurs when bacteria, viruses, fungi and parasites become resistant to antimicrobial medicines, such as antibiotics. This global issue is being accelerated by the inappropriate use of antimicrobials and poor infection prevention and control (IPC).

Why does this matter?

We rely on antimicrobial medicines to treat diseases like tuberculosis, HIV/AIDS, malaria, sexually transmitted infections, urinary tract infections and chest infections. We also rely on them to prevent and reduce the risk of infections for a range of medical treatments, such as routine surgery and chemotherapy. AMR makes infections harder to treat and increases the risk of disease spread, which can, in serious cases, lead to severe illness and death.

There is increasing recognition that antimicrobial resistant infections can be transmitted from animals to humans.[1] In agriculture, bacteria can be exchanged between livestock, poultry and farm workers through shared environmental sources.[1] In aquaculture (such as fish farming), the use of antibiotics has been associated with the emergence and spread of

antimicrobial resistant bacteria in rivers and seas,[2] and a recent study has suggested that antimicrobial resistant infections can be passed from pets to their owners.[3]

What is the role of veterinary pathologists and microbiologists?

Veterinary microbiologists work in animal disease surveillance, prevention and diagnosis, and are at the forefront of tackling drug-resistant infections in animals. They work in laboratories to identify the cause of infection and its susceptibility to antimicrobials. They advise on the responsible use of antimicrobials (antimicrobial stewardship) and on IPC. Veterinary microbiologists also work to develop new drugs, diagnostic tests and vaccines.

Veterinary anatomic pathologists work closely with veterinary microbiologists and are also involved in addressing AMR and identifying disease processes in body tissues, for example in biopsies and tissues obtained during post-mortem examinations. If an infectious disease is suspected, a veterinary anatomic pathologist will send a sample to a veterinary microbiologist for further assessment. Veterinary anatomic pathologists also work to develop new drugs and vaccines, having recently contributed to research on a potential treatment for COVID-19[4] by using insights gained from observing coronavirus infections in dogs and using the findings to apply them to the development of human medicine.

Veterinary clinical pathologists work mainly with body fluids – haematology (blood), biochemistry (chemicals in the body) and cytology (study of cells). Like veterinary anatomic pathologists, veterinary clinical pathologists work closely with veterinary microbiologists and also often work for pharmaceuticals companies to develop medicines for humans and animals.

Our call to action

The UK has seen great success in reducing antimicrobial usage in animals since 2014.[5] To help ensure this trend continues, the Royal College of Pathologists has outlined a set of recommendations.

Improved training for veterinary microbiologists and pathologists

Better training opportunities through the Department for Environment, Food and Rural Affairs (Defra), universities, the private sector and institutes that cover all types of animal species would place the UK in a stronger position to identify and tackle animal disease and AMR.

Veterinary microbiologists and pathologists are key to the surveillance of animal disease and AMR. This surveillance is vital to the protection of the public, and animal health and welfare. Defra supports training in farm animal and wildlife surveillance. However, a greater focus on equine and companion animal disease surveillance is required.

Invest in research to find alternatives to antimicrobials

Further research and evaluation are needed to explore the efficacy and safety of alternatives to antimicrobials, such as bacteriophages – viruses that can kill bacteria,[6] metal-derived compounds that can be developed for their antimicrobial activity against bacteria,[7] and probiotics, which have been shown to inhibit the growth of bacteria in farm animals.[8]

Antimicrobial medicines are critical for human and animal health, but as resistance to antimicrobial medicines naturally develops, new antimicrobials alone won't curb AMR. Alternative products must be developed.

The College supports the UK Government 5-year AMR action plan[9] and 20-year vision[10] to develop new diagnostics, therapies, vaccines and interventions.

Continued funding from sources such as the United Kingdom Research Institute and the National Institute for Health and Care Research will be crucial for advancing research into alternatives to traditional antimicrobials.

Invest in and promote the use of veterinary vaccines

Preventing disease through vaccines reduces infection rates and antimicrobial use, limiting the emergence and spread of resistance. Norway's success using vaccines in salmon farming, where antimicrobial use has been drastically reduced, exemplifies this approach.[11]

Funding from the government, investment from the pharmaceutical industry and collaboration with academia and the veterinary profession is essential to develop new and improved vaccines.

Key priority areas for vaccine development should include:

- developing vaccines to reduce *Campylobacter* infection in poultry. *Campylobacter* is a leading cause of food poisoning in humans, transmitted through improper handling and preparation of chicken and other meat products. Similar levels of *Campylobacter* resistance have been found in chickens, poultry meat and humans, indicating possible transmission of resistant bacteria through the food chain.[12]
- developing vaccines for pathogens, such as viruses and parasites that can make animals more susceptible to bacterial infections. In these cases, antimicrobials are also often used without evidence of infection. Vaccination against viruses and parasites can help reduce the risk of this happening.
- further research into the efficacy of autogenous vaccines (custom-made vaccines) by pharmaceutical companies that tackle specific farm infections to encourage their wider use across the agricultural sector.
- enhancing the uptake of existing vaccines through easier and more efficient vaccination strategies. For example, the vaccination of eggs or the use of vaccines in gel form, which can be sprayed onto the feathers of chicks.[13]

Develop rapid diagnostic tests to support better targeting of antimicrobial prescribing

Faster on-site diagnostic tests, overseen by veterinarians and conducted on farms or in clinics, can quickly identify infections and resistance, ensuring the correct antimicrobial is used. This reduces reliance on the use of broad-spectrum antibiotics, which are used to rapidly treat infections before waiting for results from samples that are processed in an external laboratory. This is particularly important in critical situations when results are needed urgently, as long turnaround times often deter vets from using tests that identify bacterial infections in veterinary practice.[14]

Speeding up diagnostic processes saves time and money by eliminating the need for external laboratory processing, enabling immediate, targeted treatment, improving animal health and welfare, and reducing the emergence and spread of resistance.

Therefore, continued collaboration between diagnostic developers and end-users is needed to ensure new diagnostics address key animal health challenges and are commercially viable.

Optimise antimicrobial stewardship through improved data collection

Farmers should be further supported in using the Medicine Hub, a database managed by the Agriculture and Horticulture Development Board (AHDB)[15] that helps farms record antibiotic use. Improved participation in this system will strengthen data collection efforts. A number of organisations, including the Veterinary Medicines Directorate, European Medicines Agency and the Responsible Use of Medicines in Agriculture Alliance, are engaged in efforts to monitor and mitigate AMR, further supporting data collection and stewardship initiatives.

The collection of accurate sales figures and use of antibiotics is essential for improving antimicrobial stewardship. By understanding how antimicrobials are used, targeted actions can be implemented to reduce their misuse. This approach has proven successful in the UK food-producing animal sector, achieving a 59% reduction in antibiotic use since 2014.[16] While over 95% of pig farms and 90% of poultry farms report antibiotic use, participation remains low in other sectors: only 28% of dairy farms, 6% of beef farms and 9% of sheep farms currently provide data.[16]

Veterinary practices should be further supported in collecting and reporting data on antibiotic sales and use in pets. Initiatives such as VetCompass[17] and SAVSNET[18] have led the way, but expanding their reach, particularly to smaller practices requires additional funding and incentives.

This aligns with the One Health approach, which the World Health Organization defines as a strategy that balances and optimises the health of people, animals and ecosystems.[19] This would provide insights into prescription patterns and support better antimicrobial stewardship. This is important, as antimicrobial use must also be monitored in companion animals, as close contact between pets and their owners has been shown to increase the risk of AMR transmission.

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