

Antibiotics Losing Their Power: Antimicrobial Resistance in Pets, Livestock and Humans

A One Health Perspective on Responsible Antimicrobial Use

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doi.org/10.5281/VeterinaryToday.23575111

Abstract

Antimicrobial resistance (AMR) is a growing global health concern that threatens the effectiveness of medicines used to treat bacterial infections in humans and animals. The World Health Organization reported in 2025 that approximately one in six laboratory-confirmed bacterial infections worldwide was resistant to antibiotics in 2023. Inappropriate antibiotic use, unnecessary prescriptions, unsupervised treatment and inadequate infection prevention contribute to the development and spread of resistance. Veterinary medicine has an important role in addressing this challenge through accurate diagnosis, responsible antimicrobial prescribing, appropriate diagnostic testing and preventive healthcare. Resistant bacteria and resistance genes can spread between humans, animals and the environment through direct contact, contaminated food, animal waste and water. Therefore, a coordinated One Health approach is essential. Vaccination, sanitation, farm biosecurity, treatment records, surveillance and adherence to withdrawal periods in food-producing animals can help reduce risks. Collaboration among veterinarians, healthcare professionals, farmers and policymakers is necessary to preserve antimicrobial effectiveness and protect animal and human health for future generations.

Keywords: Antimicrobial resistance; antibiotics; One Health; veterinary medicine; responsible antimicrobial use; bacterial infections; biosecurity; antimicrobial stewardship; food safety; public health

Introduction

Antibiotics have transformed modern medicine by making many bacterial infections treatable in humans and animals. However, antimicrobial resistance (AMR) is threatening these achievements. AMR occurs when microorganisms develop the ability to survive medicines that previously controlled them, making infections more difficult to treat.

The World Health Organization (WHO) reported in 2025 that approximately one in six laboratory-confirmed bacterial infections worldwide was resistant to antibiotics in 2023. This finding highlights the need for responsible antimicrobial use and stronger infection prevention measures [1].

Why is antimicrobial resistance increasing?

Antimicrobial resistance can emerge naturally, but inappropriate use of antibiotics accelerates the selection and spread of resistant bacteria. Unnecessary prescriptions, incorrect drug selection, unsupervised treatment and inadequate infection prevention can contribute to this problem.

Antibiotics do not treat viral infections. Their unnecessary use exposes bacteria to selection pressure without providing a corresponding clinical benefit. Resistance can also spread between people, animals and the environment, making prevention and responsible treatment essential.

The role of veterinary medicine

Antimicrobials are essential for treating bacterial infections in dogs, cats, cattle, buffaloes, poultry and other animals. Their use must be guided by veterinary examination, appropriate diagnosis and evidence-based treatment decisions.

In companion-animal practice, repeated empirical antibiotic treatment without investigating the underlying cause may delay effective treatment. When indicated, bacterial culture and antimicrobial susceptibility testing can help veterinarians select an appropriate drug.

In livestock production, vaccination, good nutrition, sanitation, suitable housing and farm biosecurity can reduce infections and the need for antimicrobial treatment. In food-producing animals, adherence to prescribed withdrawal periods is also essential for food safety.

One Health: Connecting animal, human and environmental health

Human health, animal health and environmental health are interconnected. Resistant bacteria and resistance genes may spread through direct contact, contaminated food, animal waste and water. Consequently, antimicrobial resistance requires coordinated action rather than isolated efforts by individual sectors.

India's National Action Plan on Antimicrobial Resistance 2025–2029 promotes a One Health approach, emphasising coordinated action, awareness, surveillance and responsible antimicrobial use [2].

Practical steps to combat antimicrobial resistance

- **Use antibiotics responsibly:** administer them only when indicated and under the guidance of a qualified professional.
- **Avoid self-medication:** never use leftover antibiotics or medicines prescribed for another animal without veterinary advice.

- **Follow the treatment plan:** do not independently alter the prescribed dose or duration. Consult the prescribing professional if treatment needs reassessment.
- **Use diagnostic testing when appropriate:** culture and susceptibility testing can guide treatment in recurrent, severe or non-responsive bacterial infections.
- **Prevent infections:** maintain vaccination schedules, hygiene, sanitation, adequate nutrition and farm biosecurity.
- **Maintain treatment records:** document antimicrobial use and clinical outcomes to support future decisions and surveillance.
- **Protect food safety:** follow the appropriate withdrawal period for medicines administered to food-producing animals.
- **Promote awareness:** educate animal owners and farmers about the limitations of antibiotics and the importance of veterinary supervision.

Conclusion

Antimicrobial resistance is a major challenge for modern medicine and veterinary practice. Preserving the effectiveness of existing medicines requires responsible prescribing, accurate diagnosis, infection prevention, surveillance and cooperation across human, animal and environmental health sectors.

Veterinarians have a vital responsibility to protect animal welfare while helping preserve effective treatments for future generations. Every appropriate prescription and every infection prevented contributes to this shared goal.

Antibiotics are a precious resource. Use them wisely today to protect animal and human health tomorrow.

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