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The Importance of Antimicrobial Susceptibility Testing in Veterinary Medicine: A Mini-Review

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Abstract: *Antimicrobial susceptibility testing (AST) is an important diagnostic tool in veterinary medicine, providing information that supports the selection of appropriate antimicrobial agents and the identification of bacterial resistance. Common methods include disk diffusion and broth microdilution, which provide complementary information about bacterial susceptibility. However, the clinical interpretation of laboratory results depends on the bacterial species, infection site, animal species, antimicrobial dosage regimen, and availability of appropriate interpretive criteria. This mini narrative review examines the principal methods of AST, its clinical applications, and the limitations affecting the interpretation of susceptibility results in veterinary practice. Particular attention is given to specimen quality, clinical breakpoints, minimum inhibitory concentrations, and the relationship between in vitro susceptibility and treatment outcomes. AST can support more targeted antimicrobial selection when results are interpreted alongside clinical findings and relevant pharmacological considerations. Standardized laboratory procedures and effective communication between veterinarians and diagnostic laboratories remain essential for the appropriate use of susceptibility data.*

• Introduction

Antimicrobial agents are essential for treating bacterial infections in companion animals and food-producing animals. However, antimicrobial resistance (AMR) can limit available treatment options and complicate the management of infectious diseases. Appropriate antimicrobial selection is therefore an important component of veterinary clinical practice [Theodoridou Oxinou et al., 2025, Watts et al., 2018, Guardabassi et al., 2018].

AMR is a major global public health concern, affecting both human and veterinary medicine. Its importance extends beyond individual infections because resistant bacteria can circulate between animals, humans, and the environment. Therefore, addressing AMR requires a One Health approach that promotes responsible antimicrobial use and cooperation between veterinary and human healthcare sectors

[Velazquez-Meza et al., 2022, Herman et al., 2018, McEwen and Collignon, 2018, Iancu et al., 2018, Popa et al., 2025, Palma et al., 2020, Popa et al., 2025, Gilkerson et al., 2018, Popa et al., 2025, Popa et al., 2026].

Antimicrobial susceptibility testing (AST) provides laboratory information about the response of bacterial isolates to selected antimicrobial agents under standardized in vitro conditions. The results can help veterinarians identify potentially active agents, recognize resistance, and reassess empirical treatment when the clinical response is unsatisfactory. AST is particularly relevant in recurrent, complicated, or treatment-resistant infections and when resistant pathogens are suspected [Watts et al., 2018].

This review aims to summarize the importance of AST in veterinary medicine, focusing on its principal methods, clinical applications, and limitations. The objective is to provide a concise overview of how susceptibility results can support veterinary diagnostic and therapeutic decisions.

• Material and method

This article was designed as a narrative review of the role of antimicrobial susceptibility testing in veterinary medicine. It focuses on laboratory methods, interpretation of susceptibility results, clinical applications, and practical limitations.

The review was based on relevant scientific publications, veterinary clinical guidelines, and laboratory standards addressing AST and its interpretation in veterinary medicine. The literature covered conventional AST methods, including disk diffusion and broth microdilution, minimum inhibitory concentration (MIC), clinical breakpoints, epidemiological cut-off values, and the clinical application of susceptibility results. Sources addressing the role of antibiograms in antimicrobial selection and the limitations of susceptibility testing in veterinary practice were also considered.

The selected literature was synthesized descriptively and organized around three main topics: AST methods and interpretation, the clinical importance of antibiograms in veterinary medicine, and the limitations affecting the practical application of susceptibility results. The synthesis focused on the contribution of AST to antimicrobial selection, the identification of bacterial resistance, and clinical decision-making. Particular attention was given to the distinction between in vitro susceptibility and clinical treatment outcomes, as well as the importance of interpreting laboratory results in conjunction with the animal's clinical condition and applicable veterinary interpretive criteria. The review is narrative in nature and does not include quantitative data synthesis or meta-analysis.

• Results and discussions

The veterinary microbiology literature describes several methods for assessing bacterial susceptibility. Disk diffusion and broth microdilution are among the principal approaches used in routine diagnostic laboratories [Wenzler et al., 2023].

Both methods require appropriate quality-control procedures, including standardized inoculum preparation, suitable culture media, controlled incubation, and validated interpretation. Results obtained using different methods should not be assumed to be interchangeable unless their performance and interpretive criteria support that comparison [Gajic et al., 2024, Barnes et al., 2023].

AST supports antimicrobial selection when a bacterial isolate is recovered from a clinically relevant specimen. Its value is particularly apparent when empirical treatment has failed, infections are recurrent or complicated, or resistance is suspected [Diaz-Campos et al., 2025, Bourély et al., 2018, Somayaji et al., 2019].

In veterinary medicine, AST evaluates the susceptibility of bacterial isolates to different antimicrobial agents in conditions such as canine ear and skin infections, urinary tract infections in dogs and cats, bovine mastitis, providing valuable information to guide appropriate antimicrobial selection and support the responsible use of antibiotics [Diaz-Campos et al., 2025].

Several factors limit the clinical utility of AST. Poor specimen quality, contamination, inappropriate transport, and previous antimicrobial exposure can affect bacterial recovery and complicate interpretation. Samples should ideally be collected from the relevant infection site before treatment begins, provided that this does not delay urgently needed therapy [Lefrançois and Gauthier, 2025].

Turnaround time can also be important. Culture and susceptibility testing may require sufficient time for organism isolation, identification, and susceptibility determination. In severe infections, initial treatment may therefore need to begin before laboratory results are available, followed by reassessment when results become available [Hattab et al., 2024].

The literature supports the role of AST as an important source of microbiological information in veterinary clinical practice. Its principal contribution is to characterize the susceptibility of bacterial isolates and provide evidence that can support antimicrobial selection or reassessment. However, the usefulness of the result depends on the quality of the diagnostic process and the clinical relevance of the organism tested [Bourély et al., 2018].

Although AST provides valuable information for antimicrobial selection, it should be considered one component of a broader AMR control strategy that also includes infection prevention, responsible prescribing, and continued resistance surveillance [Weese et al., 2015, Watts et al., 2018].

• Conclusions

Antimicrobial susceptibility testing is an important diagnostic tool in veterinary medicine, providing information that supports antimicrobial selection and the identification of bacterial resistance. Disk diffusion and MIC-based methods offer complementary approaches to susceptibility assessment when standardized procedures and appropriate interpretive criteria are used.

The clinical value of AST depends on specimen quality, the relevance of the isolated organism, the availability of veterinary-specific breakpoints, and the integration of laboratory findings with clinical and pharmacological considerations.

Standardized testing, careful interpretation, timely reporting, and effective communication between veterinarians and diagnostic laboratories are essential for translating susceptibility results into appropriate clinical decisions and supporting responsible antimicrobial use.

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