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7th Edition

CLSI VET01S™

Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated From Animals

Sample

CLSI VET01S includes updated tables for the Clinical and Laboratory Standards Institute
veterinary antimicrobial susceptibility testing standard VET01.

A CLSI supplement for global application.

Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated From Animals

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Abstract

The data in the tables are valid only if the methodologies in CLSI VET01¹ are followed. CLSI VET01¹ contains information about disk and dilution susceptibility test procedures for aerobic and facultatively anaerobic bacteria. Clinicians need information from the microbiology laboratory for treating and/or confirming treatment decisions for their patients with bacterial infections and depend heavily on this information for treating their seriously ill patients. The clinical importance of antimicrobial susceptibility test results demands that these tests be performed under optimal conditions and that laboratories have the capability to interpret results based on the most current breakpoints and interpretive categories for antimicrobial agents used in veterinary medicine.

The tables presented in CLSI VET01S represent the most current information for drug selection, interpretation, and QC using the procedures standardized in CLSI VET01.¹ Users should replace previously published tables with these new tables. Changes in the tables since the previous edition appear in black boldface type.

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Instructions for Use of Tables

These instructions apply to:

- **Table 1:** suggested groupings of antimicrobial agents that could be considered for routine testing and reporting by microbiology laboratories. Placement of antimicrobial agents in Table 1 is either based on approval by relevant regulatory organizations or on use consistent with good clinical practice.
- **Tables 2A through 2M:** tables for each organism group that contain:
 - Recommended testing conditions
 - Routine QC recommendations (also see Chapter 8 in CLSI VET01¹)
 - General comments for testing the organism group and specific comments for testing agent-organism combinations
 - Suggested agents that could be considered for routine testing and reporting by veterinary microbiology laboratories, as specified in Table 1 (test/report groups A, B, C, D, E)
 - Zone diameter and minimal inhibitory concentration (MIC) breakpoints
- **Tables 3 through 5:** tables for acceptable QC organisms, sources, and acceptable result ranges
- **Table 6:** table of solvents and diluents for preparing stock solutions of antimicrobial agents
- **Tables 7A through 7H:** tables describing tests to detect resistance types in specific organisms or organism groups (also see Chapter 7 in CLSI VET01¹)

I. Selecting Antimicrobial Agents for Testing and Reporting

A. Appropriate Agents for Routine Testing

Selecting the most appropriate antimicrobial agents to test and report is a decision best made by each laboratory in consultation with veterinarians, infectious diseases practitioners, clinical microbiologists, clinical pharmacologists, and antimicrobial stewardship teams, if available. The recommendations for each organism group include antimicrobial agents that show acceptable *in vitro* test performance. Considerations in the assignment of antimicrobial agents to specific test/report groups include clinical efficacy, prevalence of resistance, minimizing emergence of resistance, cost, regulatory agency-approved clinical indications for use, and current consensus recommendations for first-choice and alternative agents. Tests of selected agents may be useful for infection control and/or monitoring purposes.

B. Equivalent Agents

Antimicrobial agents listed together in a single box are agents for which interpretive categories (susceptible, **susceptible-dose dependent**, intermediate, or resistant) and clinical efficacy are similar. Within each box, an “or” **is used** between agents,

as needed, to indicate agents for which cross-resistance and cross-susceptibility are nearly complete. Results from one agent connected by an “or” can be used to predict results for the other agent. For an example, see human breakpoints for azithromycin or clarithromycin, or erythromycin against staphylococci in Table 2C-2. The results obtained from testing ampicillin could be reported along with a comment that the isolate is also susceptible to amoxicillin. For drugs connected with an “or,” combined major and very major errors are fewer than 3%, and minor errors are fewer than 10%, based on a large population of bacteria tested (see CLSI VET02⁵ and CLSI M23⁷ for description of error types). When no “or” connects agents within a box, testing of one agent cannot be used to predict results for another, owing either to discrepancies or insufficient data.

C. Test/Report Groups

The antimicrobial agents listed in groups A, B, C, D, and E in Table 1 include recommendations for appropriate reporting. Some or all antimicrobial agents listed in groups A, B, C, and D in Table 1 have been approved by the applicable regulatory agencies or authorities for treatment of diseases in the indicated host animal. Group A and B designations are also stated in the Table 2 series, which lists the breakpoints and interpretive categories for species-specific breakpoints in each organism group. To avoid misinterpretation, routine reports to veterinarians should include antimicrobial agents appropriate for therapeutic use.

- **Group A** includes antimicrobial agents with veterinary-specific breakpoints and interpretive categories that are considered appropriate for inclusion in a routine, primary testing panel for food and companion animals, as well as for routine reporting of results for the specified organism groups. The recommended hierarchy for reporting is to first report group A agents over those using human breakpoints, because these compounds have demonstrated an acceptable level of correlation between *in vitro* susceptibility test results and clinical outcome.
- **Group B** includes antimicrobial agents with veterinary-specific breakpoints and interpretive categories that are considered appropriate for testing and selective reporting. Antimicrobial agents listed in group B are considered secondary choices by the CLSI Subcommittee on Veterinary Antimicrobial Susceptibility Testing to be considered for use only when resistance is detected for agents in group A or when there are no other reasonable alternatives. Testing may be conducted routinely as part of an antimicrobial resistance (AMR) surveillance program; however, reporting should be done cautiously and with guidance from an antimicrobial stewardship program,⁸ **if available**.
- **Group C** includes antimicrobial agents that use human breakpoints and interpretive categories and are next in the hierarchy to report. These agents may perform adequately, but outcome for many veterinary applications has not been demonstrated. The veterinary laboratory may use its discretion to decide whether to selectively report the results from testing these agents.
- **Group D** includes antimicrobial agents that are regulatory agency-approved for use in the specific animal species. Although QC data are available for these agents, they do not have veterinary- or human-specific CLSI-approved

Appendix B. (Continued)

B4. *Enterococcus* spp.

Antimicrobial Agent	Cephalosporins	Vancomycin	Aminoglycosides	Clindamycin	Trimethoprim	Trimethoprim-sulfamethoxazole	Fusidic Acid
Organism							
<i>Enterococcus faecalis</i>	R ^a		R ^a	R ^a	R	R ^a	R
<i>Enterococcus faecium</i>	R ^a		R ^a	R ^a	R	R ^a	R
<i>Enterococcus gallinarum/Enterococcus casseliflavus</i>	R ^a	R	R ^a	R ^a	R	R ^a	R

Abbreviation: R, resistant.

Footnote

- a. **Warning:** For *Enterococcus* spp., aminoglycosides (except for high-level resistance testing), cephalosporins, clindamycin, and trimethoprim-sulfamethoxazole may appear active *in vitro* but are not effective clinically and should not be reported as susceptible.

NOTE: These gram-positive bacteria are also intrinsically resistant to aztreonam, nalidixic acid, and polymyxins (including colistin).

B5. Other Gram-Positive Bacteria of Importance in Veterinary Medicine

Antimicrobial Agent	Penicillin	Cephalosporins (including ceftazidime)	Vancomycin
Organism			
<i>Bacillus cereus</i> ^a	R		
<i>Erysipelothrix rhusiopathiae</i>			R
<i>Lactobacillus</i> spp. (some species)			R
<i>Listeria monocytogenes</i>		R	

Abbreviation: R, resistant.

Footnote

- a. *B. cereus* may be resistant to other β -lactam agents due to chromosomally encoded β -lactamases.

NOTE: These gram-positive bacteria are also intrinsically resistant to aztreonam, nalidixic acid, and polymyxins (including colistin).

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