

# VET01S

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

Sample

This document 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

Brian V. Lubbers, DVM, PhD, DACVCP  
Dubraska V. Diaz-Campos, DVM, PhD  
Stefan Schwarz, DVM  
Michael T. Sweeney, MS  
Joshua Hayes, PhD  
Andrea T. Feßler, DVM, PhD  
Donald J. Bade, BS  
Robert Bowden, BS  
Claire R. Burbick, DVM, PhD, DACVM  
Keith DeDonder, DVM, PhD, DACVCP  
Virginia R. Fajt, DVM, PhD, DACVCP  
Merran Govendir, PhD, BVSc, FHERDSA,  
MANZCVSc

Lacie Gunnett, BS  
Nicole M. Holliday, BA  
Sara D. Lawhon, DVM, PhD, DACVM  
Xian-Zhi Li, PhD  
John Dustin Loy, DVM, PhD, DACVM  
Kelli Maddock, MS, MLS(ASCP)M  
Ron A. Miller, MS, PhD  
Ian Morrissey, BSc, MBA, PhD, FRSM  
K. Marcia Murphy, DVM, DACVD  
Mark G. Papich, DVM, MS  
Shabbir Simjee, MSc, PhD  
S. Steve Yan, PhD  
Jeffrey L. Watts, PhD, RM(NRCM), M(ASCP)

### Abstract

The data in the tables are valid only if the methodologies in CLSI document VET01<sup>1</sup> are followed. This standard 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 VET01S represent the most current information for drug selection, interpretation, and quality control using the procedures standardized in VET01. Users should replace previously published tables with these new tables. Changes in the tables since the previous edition appear in 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 VET01<sup>1</sup>)
  - 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 7G:** tables describing tests to detect resistance types in specific organisms or organism groups (also see Chapter 7 in VET01<sup>1</sup>)

### 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, intermediate, or resistant) and clinical efficacy are similar. Within each box, an “or” between agents indicates agents for which cross-resistance

### Surrogate Agent Tests (Continued)

Surrogate Agent	Organisms	Test Description	Results	VET01S Table Location
Clindamycin	<ul style="list-style-type: none"> <li>• <i>Staphylococcus</i> spp.</li> <li>• <i>Streptococcus pneumoniae</i></li> <li>• <i>Streptococcus</i> spp. B-hemolytic group</li> </ul>	Broth microdilution or disk diffusion with clindamycin and erythromycin tested together for inducible clindamycin resistance	Predicts resistance to lincosamides (clindamycin, lincomycin, and pirlimycin) based on detection of inducible clindamycin resistance (see also Supplemental Tests - Required for Reporting Clinical Results)	7F
Oxacillin	• <i>S. pneumoniae</i>	Disk diffusion	Predicts penicillin susceptibility if oxacillin zone is $\geq 20$ mm. If oxacillin zone is $\leq 19$ mm, penicillin MIC must be done.	2D

Abbreviations: CoNS, coagulase-negative staphylococci; MIC, minimal inhibitory concentration; PBP2a, penicillin-binding protein 2a; UTI, urinary tract infection.

### Example of Equivalent Agent Tests

Equivalent Agents	Organisms	Identified by	VET01S Table Location	M100 <sup>5</sup> Table Location
Colistin or polymyxin B	Enterobacterales, <i>Pseudomonas aeruginosa</i> , <i>Acinetobacter baumannii</i> complex	“Or”	N/A	2A, 2B-1, 2B-2
Azithromycin or clarithromycin or erythromycin	<i>Staphylococcus</i> spp.	“Or”	2C-2	2C

Abbreviation: N/A, not applicable.

## IX. Quality Control

Recommendations for QC are included in various tables and appendixes. Culture collection numbers for organisms used for QC of antimicrobial susceptibility tests are included in Table 3. For disk diffusion testing, acceptable zone diameter ranges for QC strains are provided in Tables 4A and 4B. For dilution testing methods, acceptable MIC ranges for QC strains are provided in Tables 5A through 5D. Guidance for QC frequency and modifications of antimicrobial susceptibility testing systems is found in Table 4C for disk diffusion and Table 5E for MIC testing. Guidance for troubleshooting out-of-range results is included in Table 4D for disk diffusion and Table 5F for MIC testing. Additional information is available in Appendix E (eg, QC organism characteristics, QC testing recommendations).



**Table 1. Antimicrobial Agents That Could Be Considered for Routine Testing by Veterinary Microbiology Laboratories**

Selecting antimicrobial agents for routine and/or selective testing and reporting should be a collaborative decision, with input from animal species-specific expert groups, as well as veterinarians, infectious diseases practitioners, **clinical microbiologists**, clinical pharmacologists, and antimicrobial stewardship teams, if available. Some drugs listed in Table 1 may not be approved in all countries and some animal-drug combinations may be considered prohibited or illegal uses in certain jurisdictions. The laboratory client is obligated to consult regulatory agencies in the reporting country to determine if these agents can be legally administered to the species listed for these uses (see NOTE 5). Dosage regimens used when species-specific breakpoints were established for all antimicrobial agents in Groups A and B are listed in Appendix D.

Test/Report Group	Animal Species						
	Swine	Cattle <sup>a</sup>	Bovine Mastitis <sup>b</sup>	Poultry <sup>c</sup>	Horses	Dogs	Cats <sup>d</sup>
Group A - Veterinary-Specific Breakpoints					Amikacin	Amikacin	
						Amoxicillin-clavulanate	Amoxicillin-clavulanate
	Ampicillin <sup>e</sup>	Ampicillin <sup>e</sup>			Ampicillin <sup>e</sup>	Ampicillin <sup>e</sup>	Ampicillin <sup>e</sup>
					Cefazolin	Cefazolin	
			Cefoperazone			Cefovecin	Cefovecin
	Ceftiofur	Ceftiofur	Ceftiofur		Ceftiofur	Cefpodoxime	
						Cephalexin	
						Cephalothin	
						Clindamycin <sup>f</sup>	
		Danofloxacin				Difloxacin	
						Doxycycline	
	Enrofloxacin	Enrofloxacin			Enrofloxacin	Enrofloxacin	Enrofloxacin
	Florfenicol	Florfenicol					
		Gamithromycin					
			Kanamycin-cephalexin			Gentamicin	Gentamicin
							Marbofloxacin
					Minocycline	Minocycline	
						Orbifloxacin	Orbifloxacin
Penicillin G	Penicillin G				Penicillin G		