Frequently-Asked Questions: Bacteriology

What does the bacteriology section do?
The primary purpose of the bacteriology laboratory section is to assist veterinarians and animal owners in providing optimal health care for animals by identifying those bacteria and fungi causing disease and by determining the antimicrobial agents to which the bacteria may respond \textit{in vivo}. To accomplish this, the lab attempts to isolate and identify those organisms associated with infectious processes as quickly and accurately as possible. Susceptibility testing is performed on those isolates that grow in the laboratory sufficiently to provide meaningful results and are considered contributing factors to the disease process.

How do I contact the bacteriology section?
\textit{We encourage client phone calls with questions regarding the appropriate sample to submit, preliminary results, and help with interpretation of test results. Please do not hesitate to contact the lab—we are here to help!}

During regular business hours, Monday through Friday 7:30 a.m. to 5:30 p.m., please call 517-353-1683 and Saturday 9:00-11:00 a.m., please call 517-353-2296. For animal health emergencies outside of normal operating hours, please call 517-353-5275 for an automated answering system.

What is the best way to collect urine samples for culture?
The literature is pretty clear on this one; samples collected by cystocentesis are the best samples to culture for an accurate picture of the bacterial flora of the bladder. However samples collected by catheterization or free-catch can be used. It is particularly important that you indicate the method of urine collection on the submittal form as we set up the culture and interpret the culture results differently based on the method of urine collection.

Why should I do antimicrobial susceptibility testing?
Conducting a culture and susceptibility is the best way to determine the bacterial pathogens associated with disease in an animal and to guide selection of the appropriate antimicrobial. In many cases the clinician will need to select an antimicrobial for use prior to the availability of culture and susceptibility data. To do this, the clinician selects an antimicrobial that is likely to be effective against the organisms most commonly identified as pathogens of the body site of interest. A list of common organisms associated with various clinical syndromes is provided (\textit{Sample Submission and Pathogen Guidelines}) on the DCPAH CD or website. Clinicians should resist the urge to simply choose the antimicrobial with the broadest spectrum, as use of antimicrobials in this way may lead to increased resistance in the population. It has been estimated that approximately 40 percent of the time, antibiotic therapy should be changed after receipt of susceptibility testing results.

The cardinal rule of appropriate antimicrobial use is to use the right drug, dose, and dosing interval to achieve a sufficient concentration of the antimicrobial at the site of infection. Failure to adhere to this principle promotes antimicrobial resistance and therapeutic failure.
Why don’t I always get antimicrobial susceptibility data on every organism isolated?

We perform antimicrobial susceptibility testing on isolates that, after consideration of the body site and disease condition, may reasonably be expected to be involved in the disease process. Testing of isolates that are common contaminants or normal flora would not provide useful information and might lead to inappropriate antibiotic use. You are always welcome to contact the lab and request additional testing in special circumstances. There may be an additional charge for further testing. Another reason that a susceptibility test may not be done is that either the organism does not grow sufficiently well to meet the requirements of the tests or that our lab does not currently conduct testing on the particular type of organism isolated (anaerobes, mycobacteria, fungi, and mycoplasma).

Why do I sometimes get an “S” “I” or “R” result and sometimes a number?

The Bacteriology Section at DCPAH tests the susceptibility of bacterial isolates to a wide variety of antimicrobial agents. We use panels of antibiotics (see Antibiotic Panels for Susceptibility Testing on the DCPAH CD or website) which are tested for routinely based on the bacterial species, the animal source of the isolate, and, in some cases, the body site affected. Special panels of antibiotics are also available for topical therapy for eye infections and for mastitis pathogens. In addition to our routine panels, we can test for susceptibility to a number of other drugs upon special request or for highly resistant bacteria. The drugs we have chosen to test for are determined by label indications for the drugs, various federal guidelines about the use of certain antibiotics in certain species, and clinical standards.

There are two major methods used to determine the susceptibility of an organism to various antibiotics. Our preferred method of determining antimicrobial susceptibility is to use the broth micro-dilution method, which provides results in a quantitative manner as a Minimum Inhibitory Concentration (MIC). Using this method, a standard inoculum of the test bacterium is added to various dilutions of the test antimicrobial in a liquid medium. The test is incubated overnight and the highest dilution of the drug which prevents growth of the test bacterium is determined (Fig. 1, 2, and 3). This value is the MIC. Using standard charts, the MIC is also used to provide a qualitative result of Sensitive, Intermediate, or Resistant. So, results using this method are provided as the MIC (a number in μg/ml) and a qualitative result of Sensitive, Intermediate, or Resistant.

![Fig. 1](image1.jpg)
Plates containing the dilutions of appropriate antimicrobials.

![Fig. 2](image2.jpg)
Instrument used to inoculate the plates with a standard inoculum of test bacteria.
Some bacterial isolates do not grow well under the conditions of the broth micro-dilution method and in that case, the disk diffusion method (also known as the Kirby Bauer method) is used. This method involves plating the bacteria of interest on a solid agar plate and dropping antibiotic-impregnated disks onto the surface of the plate. During incubation, the antibiotics diffuse outward from the disks and create a concentration gradient of drug (Fig. 4). After overnight incubation, the zones of clearing (inhibition of bacterial growth) around the antibiotic disks are measured (Fig. 5) and standard tables are consulted to determine if the measured "zone size" indicates that the bacterium is Sensitive (S) or Resistant (R) to the tested antibiotic. A result between sensitive and resistant is designated as Intermediate (I). Therefore, the results of a disk-diffusion antimicrobial susceptibility test are reported in qualitative terms as "S" or "I" or "R" to represent the range of results.

Please see the document, “Use of Antimicrobial Susceptibility Data to Guide Therapy” on the DCPAH CD or website for more information on how to use the susceptibility data provided by DCPAH.