Diagnostic Interpretation: Do your test results mean what you think they mean?

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Abstract

In certain situations, diagnostic testing can play an integral role in beef and dairy operations through accurate diagnosis of disease and reduction of disease transmission risk. The quality and applicability of diagnostic results are dependent on the submission of proper samples and appropriate interpretation of what test results mean, along with an understanding of what test results do not mean, within the overall context of the situation. Clinical observations and gross necropsy findings are critical to efficient and accurate diagnostic testing.

The diagnostic process

There is a wide range of reasons why a veterinarian/producer may be interested in diagnostic testing including investigation of clinical disease, herd surveillance to reduce risk of disease transmission, and satisfaction of export requirements. Whatever the reason for testing, the entire diagnostic process starts with and depends on a well-defined diagnostic question: what do you intend to learn? The diagnostic question drives everything else associated with the case. Starting with a good diagnostic question allows us to choose the best test to answer that question, select the best sample to collect for that test, and identify the most appropriate animals to sample.

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How we preserve the sample also depends on which test is being run: does the sample need to be fresh or formalin fixed, chilled or frozen, placed in another preservative (such as an EDTA tube or a Trich pouch)? Collection of samples without your specific testing needs in mind can lead to invalid results or reliance on test results that may not provide useful answers.

Limitations of diagnostic tests and interpretation mistakes

No single diagnostic test is perfect; all tests and testing methods have limitations that can and should impact how we interpret results. Molecular testing is incredibly sensitive, yet this presents potential issues when it comes to the detection of endemic/commensal pathogens or recent modified live viral vaccination use. Bacterial culture requires live organism and can be severely impacted by post mortem overgrowth or recent treatment; similar issues often arise with isolation of commensal bacteria. Serologic evaluation of antibody is highly dependent on the stage of disease and previous vaccination history. Toxicology/analytical chemistry testing can be hard to interpret due to improper sample preservation or delays in collection/preservation; these types of tests are often best performed using specific sample types that may be overlooked during a routine necropsy (such as ocular fluid, bile, urine, or rumen content). Understanding the limitations of diagnostic testing is an important part of result interpretation and can help establish a proper degree of confidence.

Gross necropsy interpretation

In this author's opinion the single most important testing method available to practicing veterinarians is their own powers of observation. Accurate observation, assessment, and communication of clinical signs and gross necropsy findings is critical in disease investigations

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to ensure the development of a case definition and creation of a legitimate list of differential diagnoses. Classification of normal vs. abnormal findings through experience/repetition and the thoroughness of clinical/necropsy examinations ensures that potentially important findings are not overlooked or flat out missed. The term “pathognomonic” is probably overused but it can absolutely apply to several common diseases/gross observations in cattle, as long as the finding aligns with the context of the case. Issues arise when the term is applied to non-specific lesions or diseases become mistakenly linked with findings that may or may not be abnormal at all. Your gross necropsy findings should tell a coherent story of the disease process. And remember, “no gross lesions observed” is a perfectly fine statement….as long as it is truly accurate.

Laboratory resources

Practicing veterinarians are encouraged to find and develop relationships with knowledgeable diagnosticians, as well explore and fully utilize resources provided by their diagnostic laboratory. Many labs publish sample collection guides, demonstration videos, and examples of testing strategies on their website. Nearly all have extensive online testing catalogues that include information such as the cost and testing schedule as well as preferred sample types. User friendly web-based submissions have become widespread and should be considered (especially for those that write in their own font); additional information such as pictures are videos can be uploaded/included with the case, and several labs have shipping programs that can reduce the cost of getting samples to the lab. All of these features are designed to get accurate test results into the hands of practitioners in a timely manner, while reducing the cost of inappropriate/unnecessary testing to the producer.

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