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Quality Laboratory Samples Necessary for Accurate Disease Diagnosis

This NebGuide discusses the importance of submitting proper specimens to the veterinary diagnostic laboratory as an aid in diagnosing infectious diseases, feed imbalance, or animal poisoning.

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To comprehend the reasons for failures in disease diagnosis at veterinary diagnostic laboratories, it is important to understand what disease is, what causes disease, how the animal resists disease (becomes immune), and what happens to the animal if disease develops and the animal does not become immune.

According to *Stedmans Dictionary*, disease is an interruption, cessation or disorder of body functions, systems or organs. Some diseases may be obvious to the untrained eye, but many are detected only by using sophisticated testing procedures (subclinical disease). Serious irreversible damage can occur in subclinical disease if therapeutic or preventive measures are not undertaken early. Accurate diagnosis is necessary to correct the cause of the problem.

The Causes of Disease

Causes of disease may be categorized into two types:

1. **Nonliving**, such as chemical poisons (toxins), excessive heat or cold, nutritional deficiencies or imbalances, others; and
2. **Living**, infectious agents or pathogens, viruses, bacteria, fungi and large parasites such as lice and worms.

Resistance to Infectious Agents

Resistance can be divided into two types:

1. ***Nonspecific or innate resistance***, which is resistance present in the normal animal prior to infection; and
2. ***Specific immune resistance***, which is resistance that arises only after repeated exposure to the disease agent. In these cases immune responses can occur that aid in determining a cause of disease.

Innate Resistance: This type of resistance includes natural barriers such as skin, washing effect of secretions such as tears, and certain normal responses such as coughing. Each of these is a part of the individual from birth, but each may be significantly altered by hereditary, nutritional and environmental factors and infectious diseases.

Specific "Immune" Resistance: This type of resistance usually arises following exposure of the animal (particularly the white blood cells in the animal) to the infectious agent (an antigen). This exposure can occur during natural infection, or by artificial inoculation of the animal with vaccines.

In most cases the animal will respond to the vaccine (antigen) by producing immune substances called *antibodies* that react *specifically* with the vaccine. Occasionally an animal does not respond sufficiently and is not protected.

Such animals, in spite of vaccination, have failed to become immune--they are not *immunized*.

Furthermore, when actual disease agents infect an animal, immunity does not always occur (antibodies do not develop). In this case the animal becomes sick and is infected.

Antibodies, if present, are found in various body organs and fluids (blood, tears, milk, etc.), and can be used in disease diagnosis. Body tissues and fluids, if submitted properly, can help determine the cause of disease, when it occurred, the animal's immune status, vaccine effectiveness, and other important data.

Necropsy (postmortem exam) of dead or terminally ill animals improves disease diagnosis. Proper collection and preservation of animal tissues prior to submission to a veterinary diagnostic laboratory is *essential* for an accurate and timely diagnosis.

Improper or poorly preserved specimens generally are of little diagnostic value and occasionally lead to a wrong diagnosis. By consulting with your veterinarian, proper tissues can be collected and preserved for evaluation at the veterinary diagnostic laboratory. In some situations submission of sick animals or recently dead, intact animals is warranted.

There are two important guidelines for aiding a diagnosis by the veterinary diagnostic laboratory.

1. ***Keep accurate records.*** Knowledge of herd size, ages, vaccination programs, previous herd diseases and treatments, herd behavior (symptoms), location of the herd, and herd diet and ration mix provide crucial information. Herd history from client and veterinary records should accompany the laboratory request form.
2. ***Contact your veterinarian when disease is first seen.*** It is important to collect tissues and fluids in a sanitary manner as soon as possible after death of the animal.

Isolation of many infectious agents (bacteria, viruses) is most successful when tissues or fluids are submitted to the laboratory within a short time after collection. Many infectious agents die in decomposing animal tissues and a diagnosis cannot always be made. Furthermore, decomposed tissues cannot be accurately examined (microscopically) by the diagnostic pathologist.

Decomposition can be minimized by the local veterinarian if necropsy is done soon after death and the tissue is "fixed" in formalin (a chemical that is like embalming fluid) prior to submission.

Because antibiotic treatment often kills certain infectious agents, your veterinarian may suggest that a sick but untreated animal be sacrificed. This allows for the collection and preservation of fresh tissues, and often enhances the isolation and identification of certain disease-causing agents and/or the ability to recognize pathologic changes in tissues.

It should be emphasized that the above guidelines apply not only to diagnosing infectious disease, but also to diagnosing toxicologic problems (poisonings, mineral imbalances, etc.) and metabolic problems (milk fever, pregnancy toxemia, etc.). Quality and the proper tissues or samples are an absolute necessity.

Summary

Accurate diagnosis of livestock diseases can be frustrating and often requires assistance from a veterinary diagnostic laboratory. Submission of proper animal tissues and fluids facilitates an accurate and timely diagnosis by the laboratory. *By consulting your veterinarian* and by following the guidelines set forth in this NebGuide, the chances for an accurate diagnosis can be improved.

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