Identifying Plant Poisoning in Livestock

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Poisonous plant intoxication is a common and often deadly problem costing the western livestock industry in the United States more than $340 million every year. Despite the costs and high frequency of occurrence, arriving at a positive diagnosis of plant poisoning in livestock is challenging. The purpose of this paper is to provide a framework to help range professionals make an accurate, or definitive, diagnosis. We provide suggestions for investigating and sampling field cases of suspected plant poisoning, and for integrating important information.

An essential part of making an accurate diagnosis is obtaining and understanding the animals, location, plant communities involved, and management strategies being used (Table 1). Compiling animal information such as type and condition of animals, age, sex, nutritional status, and vaccination history as well as identifying clinical signs, lesions, number of affected animals, and progression of disease are the first steps in identifying a cause. These findings are critical because they will be used to direct the investigation. This background information should be included with all samples collected and when submitting samples to your veterinarian or diagnostician. This information is essential to all involved in helping make an accurate diagnosis.

Once this information is gathered, a list of potential causes called a “differential diagnosis” should be developed. This list will be used to develop an investigative plan that will focus on confirming the right diagnosis and excluding all other possibilities. Making a complete and thorough list will require engaging appropriate experts (Table 2). The local veterinarian is a key player in this process. Many infectious, degenerative, and immunologic diseases produce clinical signs, biochemical changes, and lesions identical to those caused by toxins and poisonous plants. Local veterinarians will be familiar with disease conditions that occur in the area. He or she will also know other local or state experts, such as toxicologists, diagnosticians, or pathologists, who might contribute to the diagnostic process. The differential diagnosis list should be as complete as possible so that appropriate tests can be used to confirm the cause of the clinical syndrome.

The next step is to use the list of differential diagnoses to formulate a plan to rule out or confirm possible causes. The plan will probably include field investigations, physical examinations, biochemical or serologic evaluations of the blood, possible postmortem evaluations, and, at times, chemical or microscopic evaluations of plants or animal tissues.

Field Investigations

Field studies are an essential part of most investigations and should be conducted early in the diagnostic process. You may want to seek out experts who might contribute to these studies, including extension agents and local or state veterinarians. The list of differential diagnoses should include a short list of plants that might produce the clinical symptoms observed. Many county extension agents are trained in plant identification, or they can be very helpful in finding outside experts (Table 2). Close examination of pastures and ranges should include a determination of what plants are present in the community and what plants the animals are eating. Plants that were included in the list of differential diagnoses or unidentified plants should be collected for positive identification. Plant samples are best collected in paper bags. If plant samples are to be mailed to the local herbarium or the Poisonous Plant Research Laboratory, they should be pressed and dried. The entire plant should be collected if possible. Flowering plants are most easily identified. A convenient way to press plants is to place them between two pages of a newspaper and press them under a couple of heavy books for several days. Pressed plants may be mailed in a large envelope taped to a sheet of cardboard. Most state land grant or agricultural colleges have herbaria with experts able to identify most plants. The Poisonous Plant Research Laboratory, in collaboration with the Intermountain Herbarium at Utah State University, has taxonomic capabilities if local options are unavailable.

Since the toxicity of a plant is often variable, additional plant samples may be needed for a chemical evaluation of potential toxins. It is best to label carefully and freeze freshly collected plant samples in plastic bags if the samples are to