

How to work up a bovine toxicology case

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Abstract

Toxicology cases involve approximately 10% of bovine cases typically seen in practice. Because toxicology cases are not seen every day you might not feel familiar with how to work up a toxicology case. Sometimes the hardest part of a toxicology case is deciding when the case you are working on involves a potential toxin. In this presentation I mention the commonly requested toxicology analysis involving cattle. History and a time line are critical parts of a toxicology workup. To be a good veterinary toxicologist you have to have good observational skills and know what common management practices can result in potential toxicology issues. Toxicology is not always just an overdose, many cases involving deficiencies that can mimic infectious disease. Collection of the correct feed sample is critical to making a diagnosis in toxicology. Many times the feed sample we need is not available because the actual toxicosis occurs days before. We collect a feed sample when animals are dying but many times this is not the appropriate feed sample. In many cases of vaccine failure or animals not responding to natural challenge with an infectious agent, nutrition is involved. Poisonous plant involvement in a case is always an enigma but can be worked out with the proper work up.

Key words: history, timeline, appropriate feed sample, nutrition

Resume

Les cas de toxicologie constituent près de 10% des cas rencontrés couramment en pratique bovine. Parce que des cas de toxicologie ne surviennent pas à tous les jours, vous pourriez ne pas être familier avec la procédure d'investigation d'un cas de toxicologie. Quelques fois la partie la plus difficile d'un cas de toxicologie est de décider si le cas en question implique une toxine potentielle. Dans cette présentation, je souligne les analyses toxicologiques les plus souvent demandées chez les bovins. Les antécédents et la chronologie sont les éléments clés d'un bilan toxicologique. Pour être un bon toxicologue vétérinaire, il est nécessaire d'avoir un bon sens de l'observation et savoir quelles pratiques de gestion courantes peuvent causer des problèmes potentiels de toxicologie. Un problème toxicologique n'est pas toujours une simple dose excessive car plusieurs cas impliquent des insuffisances qui peuvent ressembler à une maladie infectieuse. Recueillir les bons échantillons d'aliments est essentiel pour faire un diagnostic toxicologique. Il arrive plusieurs fois que l'échantillon d'aliments nécessaire n'est pas disponible parce

que la toxicose a eu lieu quelques jours avant. On recueille un échantillon d'aliments lorsque les animaux meurent mais cet échantillon n'est souvent pas l'échantillon approprié. L'alimentation est impliquée dans plusieurs cas d'échec vaccinal ou lorsque les animaux ne répondent pas naturellement à l'agent infectieux. L'implication de plantes toxiques dans un cas est toujours une énigme mais elle peut être déterminée avec le bilan approprié.

Introduction

Toxins I will cover include: nitrate; cyanide; gossypol; OP/carbamates; blue-green algae; non protein nitrogen; high sulfur feeds; injectable minerals; ionophores; mycotoxins; water quality; injectable minerals; Se; Cu; Fl; Pb; phytoestrogens; Perilla mint; Rye grass; Bermuda grass; Ca issues in chicken litter for lactating cows; high K, Ca and Mg problems; pesticides and herbicides; ammoniated hay; oak; and dog bane.

Working up a Case

Working up a potential food animal toxicology case can be frustrating. I would like to cover how I work up a typical food animal toxicology case. You don't get the opportunity to work up toxicology cases as often as you do infectious diseases cases, so it is a matter of being familiar with what can be done analytically. We do a great job of teaching bug and drugs, but there is limited exposure to food animal toxicology in veterinary school. As a result many practitioners don't have the confidence to work up a potential toxicology case. There are many analytical options to investigate veterinary cases. You have to have a plan prior to doing analytical chemistry. The "poison screen" does not exist. We can't look for all potential toxins using only 1 analytical method. There are many potential toxins we can look at using a variety of analytical methods. Instrumentation is improving all the time.

Common analytical tests for the bovine include:

1. Analyzing serum, tissue, whole blood, urine, rumen content, feed or ocular fluid for nitrates, ammonia, Ca, Mg, acetylcholinesterase, and certain feed additives.
2. Analyzing serum, tissue, whole blood or feed for certain minerals, heavy metals, chemicals or vitamins.
3. Mycotoxins in feed and certain tissue or fluids.
4. Water quality.

A common request is to look for all potential toxins.

If you aren't familiar with how to work up a case or what samples to collect call your local veterinary diagnostic lab and

find out who is in charge of the veterinary analytical lab. Have a discussion of the case prior to submission of samples. It is always better to collect as many samples as possible. All the samples don't have to be analyzed, but if you need a sample and it wasn't collected it can complicate the ability to make an accurate diagnosis.

Toxicology cases need to be worked up doing histopathology initially because this is the most cost effective thing you can do. Toxicology cases are worked up step by step, so it is best not to run all testing initially unless the deaths are continuing and you need an answer immediately. I like to evaluate what the tissues tell you in order to decide what analytical testing to proceed with. The increased screening involved because of the lack of a good history, clinical signs, tissues, fluids, feeds etc., results in more money being spent. My ability to make a diagnosis becomes less likely the more I spend, because this means I am not finding anything.

A negative analytical test does not rule out the toxin of interest. All the negative result means is that the toxin wasn't found in this sample at that time. There are many reasons for a negative result other than "this isn't the toxin that caused the problem". A positive result is positive, a negative result does not mean the analyte in question is not the cause of the toxicosis.

Observations and considerations

What has changed in the environment, weather and season, feed, water, access to poisonous plants, exposure to toxins? Any discrepancies in what was thought was being done and what was done.

Tissues that are useful include:

- brain
- spinal cord
- heart
- lungs
- liver
- spleen
- skeletal muscle
- ocular fluid
- urine
- rumen content
- intestine (large and small)
- lymph nodes
- kidney
- 2nd rib bone

Is clotted heart blood a good sample? Is post mortem serum a good sample? Is a rumen sample homogeneous? Is a rumen sample the same as a feed sample?

If there is potential for litigation what do I need to do? Are photos and videos helpful or should I not take these? How do I document this case?