

# Forensic Toxicology And The Bovine Practitioner

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Forensic toxicology is that branch of toxicology dealing with the medical-legal aspects of the harmful effects of chemicals on humans and animals. The legal aspects involve the acquisition of information which pertains to the cause-effect relationship between exposure to a chemical substance and the harmful effects of the chemical. Forensic toxicology involves analytical chemical methodology and interpretation of results. Forensic veterinary toxicology involves both the accidental and intentional poisoning of animals. Poisoning of animals, whether accidental or intentional, may result in litigation where the veterinarian may be called as a witness of fact, expert witness or occasionally as the defendant.

The Oklahoma Animal Disease Diagnostic Laboratory investigates a large number of cases each year, many of which have legal implications. The majority of bovine cases with legal implications involve oil field wastes, feed additives such as urea, feed contaminants such as mycotoxins, pesticides, drugs and malicious poisoning. The laboratory has also investigated cases of insurance fraud and animal mutilation cases where unusual drug residues were identified.

## Potential Legal Cases:

- 1) Malpractice
- 2) Drug related
- 3) Feed related
- 4) Oil field wastes
- 5) Malicious poisoning
- 6) Pesticides
- 7) Environmental contamination
- 8) Insurance fraud

Approximately 15% of the toxicology cases investigated at the Oklahoma Animal Disease Diagnostic Laboratory are oil field related and involve drilling sites, production sites and pipelines.

## Oil Field Related Cases:

- 1) Petroleum and condensates
- 2) Drilling muds and chemicals
- 3) Heavy metals
- 4) Salt water
- 5) Mechanical injury

Feed related cases are the second largest category with the potential for litigation.

## Feed Related Cases:

- 1) Nitrate
- 2) Urea
- 3) Mycotoxins
- 4) Feed additives and drugs
- 5) Salt
- 6) Heavy metals

Drug related cases are also frequently encountered.

## Drug Related Cases:

- 1) Adverse drug reactions
- 2) Pesticides
- 3) Drug interactions

Malicious poisoning and insurance fraud cases, while less frequent, may involve criminal actions.

## Malicious Poisoning and Fraud Cases:

- 1) Arsenicals
- 2) Pesticides
- 3) Nitrate fertilizer
- 4) Drugs
- 5) Petroleum products

Nearly every poisoning case is a potential court case requiring that accurate records be kept. Essential information should be recorded and documented.

## Records should include the following essential information:

- 1) Owner's name and address
- 2) Date illness or deaths occurred
- 3) Events in chronological order
- 4) Death losses
- 5) Species, breed, sex, age and weights of animals involved
- 6) Identifying marks on animals or tag numbers
- 7) Comments on management and feeding
- 8) Vaccination history
- 9) History of past illness
- 10) Detailed history of clinical signs
- 11) Description of postmortem findings
- 12) Number of herd and number affected
- 13) History of medication and pesticide use
- 14) Map of area where animals are located. Note ponds, oil wells, dumps and the like.
- 15) Identify, date and initial all samples to be submitted to the laboratory

- 16) Note any additional circumstances that may suggest possible poisoning
- 17) Pictures are often of value and a good camera is a worthy investment
- 18) Have sample collection witnessed if possible.

**Diagnostic criteria for poisoning cases include the following:**

- 1) History
- 2) Clinical signs
- 3) Postmortem and histopathological findings
- 4) Chemical analyses
- 5) Laboratory animal tests
- 6) Interpretation of findings

**Chemical analysis is the single most important criterion if used properly and in the right perspective. Chemical analyses require proper samples and sampling technique, proper sampling integrity and chain of possession. When all else fails, or under certain circumstances, laboratory animal tests such as feeding trials with suspect feed or water may be conducted.**

Specimens for toxicological analyses must be properly obtained, placed in appropriate containers, sealed, signed, dated and the chain of possession in all cases must be intact and properly logged. It is usually a good idea to split and store properly labeled samples for future reference if litigation is expected.

When possible submit samples in approved containers and ship on ice to arrive at the laboratory in the best possible condition. Formalin fixed tissues are not suitable for chemical analyses.

**In nearly every instance an intact animal representative of the problem is the best specimen to submit to the diagnostic laboratory for a complete work up. Feed and water samples should be properly identified. Five pounds of feed and one quart of water is the minimum sample size that should be submitted.**

Proper interpretation of laboratory results will be essential to the case. Interpretation of results may require consultation with toxicologists, review of the current literature and correlation of the findings to the clinical signs and circumstantial evidence.

**In preparing for a toxicology court case, the following should be considered:**

- 1) **Review the case with the client and attorney and ask what is expected. Educate the attorney as best you can regarding the facts of the case and your interpretations.**
- 2) **Establish whether you will be testifying as a witness of fact or as an expert witness in the case. Only the certified expert witness can give opinions. The witness of fact is forbidden from testifying as to his beliefs or opinions.**
- 3) **Keep in mind the concept of privileged information and do not discuss the case with anyone other than your client and attorney.**
- 4) **Review the data and current literature to best guide the attorney in his preparation of the case.**

**Some unusual forensic toxicology cases investigated by the Oklahoma Animal Disease Diagnostic Laboratory.**

- 1) Confirmed succinylcholine residues in the liver of a calf suspected of having been sacrificed and mutilated by a satanic cult.
- 2) 16 of 33 head of cattle died after being wormed with a thiabendazole wormer. Confirmed the material was not thiabendazole but an oil base paint of the same color.
- 3) Highly insured syndicated bull suspected to have died from urea. Confirmed rumen acidosis from feed overload, no urea in feed.
- 4) Acetylpromazine residues found in liver of calf. Evidence that the calf was being stolen.
- 5) 70 sick and 23 dead of a consignment at stockyards. Confirmed sodium ion toxicity. Excessive salt in feed followed by water deprivation and subsequent water loading.
- 6) Several calves sick and several dead following consumption of grain contaminated with hydraulic fluid.
- 7) 30 cows, 1 bull, 2 horses. Malicious poisoning with arsenic treated sweet feed. Owner was later shot and killed.
- 8) Several head of cattle died after consuming vegetation from an electric power line right-of-way. The forage was analyzed and found to have been sprayed with an arsenical herbicide.
- 9) Diagnosed chromium poisoning in several head of cattle that died near drilling site was confirmed as source.
- 10) Confirmed that rumen contents contained used motor oil and not crude oil from broken pipeline.