

Nitrate Toxicity - Silent Killer

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Nitrate toxicity is the most common toxicity problem observed in range cattle in Arizona. This toxicity can cause the rapid loss of a large number of cattle. Cattle on out on the range can very quickly consume a toxic amount of nitrates in plants or water. This is only one of many possible plant toxicity problems that should concern livestock owners.

Cattle are **the most susceptible** domestic species to nitrate toxicity. This is because in their rumen, **nitrate** (from plants or drinking water) is converted to **nitrite**. Nitrite is readily absorbed by the lining of the rumen into the blood system. Once in the blood nitrite interacts with red blood cells. The nitrite binds with hemoglobin and forms **methemoglobin**. In normal red blood cells hemoglobin is responsible for transporting oxygen from the lung to tissues. Methemoglobin cannot transport oxygen, so if too much nitrite is absorbed cattle can quickly die of hypoxia, lack of oxygen to the brain and heart.

Cattle are seldom seen with clinical signs of nitrate toxicity; they are often completely normal one day and found dead the next. If clinical signs are seen, an early sign is salivation followed by frequent urination. Soon after, the cattle exhibit difficulty breathing, increased respiratory rate, and dark brown or "chocolate" colored blood and mucous membranes. The animals then become weak, reluctant to move, and have convulsions before they die. If pregnant cattle receive a dose that is not quite deadly, they may abort soon after recovering. This toxicity can kill cattle in just a few hours after they ingest nitrate in feed or water. Pregnant cattle exposed to nitrate may survive the toxin but will abort their calf from the effect of nitrate on the blood supply of the calf. If cattle are found with nitrate toxicity, they can be treated by giving methylene blue IV. The dose is 25

ml (cc) of a 1% solution for an adult cow. This product is difficult to obtain but your veterinarian should have some. Cattle should be provided low nitrate feed (hay) and water. If cattle are not yet showing signs, but are experiencing nitrate toxicity and are driven a long distance or driven hard they may develop respiratory distress and some may die.

There are several plants (weeds) in Arizona that can have high levels of nitrate. One of the most common are the plants of the *Amaranthus* genera (pigweed, carelessnessweed). Others include: lamb's quarters, Johnson grass, mallow, Russian thistle, and Canadian thistle. In addition, plants used for hay that have been over fertilized or stressed by cold (frost) or drought can accumulate nitrates. Curing plants for hay does not reduce the nitrate levels. **The highest levels of nitrate are found in the stems and not the leaves.** Cool, cloudy days will enhance the formation nitrates in range plants. Drinking water can also be high in nitrates because of runoff from fertilized land. If you are worried about possible nitrate problems, you can have your forage and water tested for nitrate levels.

If livestock producers are finding dead or dying cattle they are encouraged to contact their local veterinarian, livestock officer or extension office. The Arizona Livestock Incident Response Team (ALIRT) has been developed to assist producers that may be dealing with extensive livestock losses and may be able to help if you are dealing with nitrate toxicity. You can find more information about ALIRT at this web site: <http://ag.arizona.edu/ans/alirt/index.html> or by contacting the Arizona Cattle Growers Association, the Arizona State Veterinarians Office (888.742.5334 option #5), Dr. Peder Cuneo at the Arizona Veterinary Diagnostic Laboratory (520.621.2356 ext 19) or Dr. Bob Kattinig (520.621.9757).