Pennsylvania Game Commission Wildlife Disease Reference Library

Rumen Acidosis

Other Names: Grain overload, corn toxicity, lactic acidosis, carbohydrate engorgement

Cause

Rumen acidosis occurs when wild or domestic ruminants (deer, elk, moose, cattle, sheep etc.) ingest large quantities of readily digestible and highly fermentable carbohydrates, usually grain. Corn, wheat, and barley are most commonly responsible for rumen acidosis, while apples, grapes, bread, and sugar beets are less commonly involved.

Significance

This disease occurs in wild deer, elk, and moose when they suddenly gain access to a source of grain. Rumen acidosis can result in sporadic rapid deaths, but does not currently have a significant impact on wild ruminant populations. However, in restored or endangered populations it can be a serious source of mortality. In addition, its affect may be underestimated because of the inability to quantify those who survive and yet have shortened life spans because of the effects of this disease.

Species Affected

Rumen acidosis can occur in any ruminant. This disease is commonly observed in deer, elk, moose, and domestic cattle. Bison seem less susceptible, but can still suffer from grain overload.

Distribution

This disease can occur anywhere in the world when wild or domestic ruminants are suddenly introduced to large quantities of carbohydrates.

Transmission / Disease Development

The natural diet of deer and elk changes with the season and available foodstuffs but is generally high in fiber and low in carbohydrates. A sudden change in diet to high carbohydrate and low fiber disrupts the normal microflora (bacteria, protozoa, and fungi) in the rumen that is necessary for digestion. Carbohydrate digesting bacteria, which are normally present at lower densities, overwhelm the other flora and produce

large amounts of lactic acid. This reduces the rumen pH to 5 or lower, which is too acidic for most of the normal rumen microflora. The acidification also reduces rumen motility so ingesta become trapped in the rumen. Fluid also moves into the rumen and becomes trapped, resulting in dehydration of the animal. The lactic acid is absorbed into the bloodstream and rises to potentially fatal levels; the acid also erodes the lining of the rumen causing inflammation and ulceration of the parts of the rumen wall that is responsible for absorbing nutrients.

The severity of rumen acidosis depends on many factors including the type and amount of grain consumed and whether or not the animal had recently ingested that type of grain. When a toxic amount of grain is consumed, the rumen flora population will die within 2 to 6 hours.

Rumen full of grain with acidic pH; photo courtesy of the PSU Animal Diagnostic Lab

Clinical Signs

Within 24 to 48 hours of ingesting large quantities of carbohydrates, the animal will stop eating and may be staggering, unable to rise, or standing quietly. Affected animals often have an enlarged rumen, diarrhea, and a normal temperature. The most severely affected will die within 24 to 72 hours. Since death is sudden, animals are usually in good body condition. At necropsy, the rumen is often full of corn or other grain, and their may be dark red erosions in the lining of the abomasum.

Diagnosis

Rumen acidosis can usually be diagnosed when ruminants in good body condition are found dead with large quantities of grain in their stomachs. Laboratory analysis of the rumen microflora can be used to support the diagnosis. The pH begins to rise after death and normal values at necropst do not rule out the disease.

Treatment

There is no treatment for rumen acidosis in wild ruminants because they are typically found dead. Likewise there is no treatment for those who escape death but have permanently damaged rumen lining.

Management/Prevention

Supplemental feeding of wild ruminants is often the cause of rumen acidosis; restrictions on supplemental feeding may help prevent the occurrence of this disease. In Pennsylvania, the Game Commission prohibits feeding of elk and feeding of deer is strongly discouraged.

Suggested Reading

Grain Overload. 2011. The Merck Veterinary Manual. <http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/21703.htm&word=grain%2coverload>.

Michigan Department of Natural Resources. Wildlife Disease. Corn Toxicity. < http://www.michigan.gov/dnr/1,1607,7-153-10370_12150_12220-26481--,00.html>.

Please Don’t Feed The Deer. May 2007. Pennsylvania Game Commission.