

Urea Acute Oral Toxicity

A web search for urea and wildlife reinforced the procedural guidance of cleaning loading sites. Most of the information about urea and animal toxicity deals with cattle and other domestic ruminants because urea is regularly used as a nitrogen supplement in cattle feed.

*Urea toxicity is highly dependent on the rate at which urea degrades to ammonia. Humans and monogastric animals do not rapidly convert urea to ammonia and urea is practically nontoxic following ingestion by these species. However, ruminant animals very rapidly convert urea to ammonia following oral ingestion and are much more susceptible to toxicity following ingestion of urea. Accidental ingestion of granules of urea should be considered nontoxic unless a large amount was ingested.*¹

Quick Facts...

- Urea can be fed to ruminants as an economical replacement for a part of the protein in a ration.
- The amount of urea a ruminant animal can use depends on the digestible energy or total digestible nutrients (TDN) content of the ration.
- No more than 45 to 113 grams of urea per head per day should be fed to feedlot cattle.
- Toxicity should not be a problem if urea is fed according to recommendations.

Many years ago, researchers recognized that nonprotein nitrogen (NPN) compounds are used by bacteria in the rumen of cattle and sheep. Since that time, studies show that these compounds are broken down to ammonia during the normal fermentation process in the rumen. Animals with simple stomachs (pigs and chickens) cannot make use of large concentrations of NPN compounds because of a lack of enzymes and bacteria to break down the NPN to ammonia and synthesize it into protein.²

Table of urea oral toxicity

LD50	Rat ³	14,300 mg/kg
LD50	Mouse ³	11,500 mg/kg
LD50	Cattle ³	510 mg/kg
LDLO	Dog ⁴	3,000 mg/kg
LDLO	Goat/sheep ⁴	511 mg/kg
LDLO	Pigeon ⁴	14,800 mg/kg
LDLO	Rabbit, oral ⁴	10,000 mg/kg

LDLO – the lowest published lethal dose of a substance determined by testing on animals.

A 1000-pound cow needs to consume 150 grams of urea in 30 minutes for toxicity to occur.⁵

Deer and moose are ruminants. No toxicity data specific to them was found. Given that they are ruminants, it seems reasonable to conclude that urea toxicity is similar to other ruminants, therefore in the vicinity of 500mg/kg of body weight. Cleaning of loading sites and spills should provide adequate protection from excessive exposure to urea, and the normal application rate of urea pellets on the forest floor should not pose a toxicity risk to ruminants.

Other references:

http://www.goatworld.com/articles/urea_toxicity.shtml

<http://www.luresext.edu/goats/training/nutrition.html>

- 1.) <http://www.stcloudstate.edu/osh/documents/documents/UREA.pdf>
- 2.) <http://www.ext.colostate.edu/Pubs/livestk/01608.html> (Colorado State U)
- 3.) Agrium MSDS
- 4.) Table 4 in: http://www.pnl.gov/main/publications/external/technical_reports/PNNL-15747.pdf
- 5.) <http://cattle.purinamills.com/Library/Bulletins/ECMD002303.aspx>