Uranium Toxicity in Wyoming Livestock and Wildlife

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Methodology

- Data is derived mainly from peer-reviewed journals, clinical reports and to a limited extent clinical data
  - Mainstream journals
  - Clinical reports
  - Professionals in the field
- No “Uncertainty Factor” used in the development of this document
  - Difficult to determine the level of “acceptable risk”
  - Allows individuals the ability to make judgment calls based upon the level of risk THEY are willing to take!
Health Effects

- Chemical toxicity of natural U is much more likely to be a risk to animal health than radiation from naturally occurring U

- Kidney damage is a more sensitive indicator than effects on growth and reproduction

- Damage occurs due to the removal of U from blood via the kidney
  - Biochemical indicators of tubular damage
  - Necrosis of the proximal tubules
  - Damage to the glomerular basement membrane (reduced glomerular filtration)
Sources of Dose-Response Data

- Virtually no large mammal experimental studies exist
  - Typically n=1-3, very weak experimental designs
  - Large discrepancies exist in the limited data that is available
- Great majority of experimental data consists of rodent studies
  - Injections
  - Feeding studies
  - Enriched/depleted U studies
- Scaled from rodent to ungulates allometrically, then cross checked results against other (smaller) studies
Recommendations

- Based upon limited toxicity data, we believe that water containing less than 0.065 mg/L uranium should not have negative physiological effects upon wildlife and livestock.
- Toxic water concentration derived from rodent data and a scaling formula published by Sheppard et.al (2005)
- Water intake value based upon a yearling steer, consuming water at a conservative rate of 20% body weight
- Further uranium toxicity (especially exposure from water) studies are warranted
Due to the possible release of other harmful water contaminants during the in situ mining process, we believe that other toxicological problems may arise.

Possible contaminants include:
- Selenium
- Arsenic
- Sulfates
- etc.

Release of these contaminants due to in situ mining processes could possibly pose a greater risk to livestock and wildlife than U
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