MONTANA STATE UNIVERSITY EXTENSION

Cow Sense Chronicle

August 2013

Water Quality for Beef Cattle

Last month's issue focused on beef cattle water requirements. As promised, this issue will focus on water quality. While each testing lab is a bit different, most water quality analyses will measure for sodium, calcium, magnesium, pH, nitrate, sulfate, and total dissolved solids.

Total dissolved solids (TDS) consist of the dissolved salts (i.e., salinity) in the water, including sodium, chloride, carbonates, nitrates, sulfates, calcium, magnesium and potassium. It is generally expressed in parts per million (ppm). A guide to livestock and poultry response to saline water is summarized in the table below.

Total Dissolved Solids (ppm or mg/L)	Animal Response
Less than 1000	Relatively low in salinity. Excellent for all classes of livestock and poultry.
1000-2999	Very satisfactory for all classes of livestock and poultry. May cause temporary and mild diarrhea in livestock not accustomed to the water.
3000-4999	Satisfactory for livestock, but may cause temporary diarrhea or be refused at first by animals not accustomed to the water. Poor water for poultry.
5000-6999	Can be used with reasonable safety for cattle, sheep, swine, and horses. Avoid use for pregnant or lactating animals. Not acceptable for poultry.
7000-10000	Considerable risk for pregnant or lactating cows, cattle in confinement, horses, or sheep or young of these species. In general, should avoid use. Unfit for poultry and probably for swine.
Over 10000	Extremely high risk. Not recommended for use under any conditions.

Additional Resource: SDSU livestock water quality web page.
http://www.sdstate.edu/abe/wri/water-quality/livestock.cfm

High-sulfate water is not uncommon in many areas of Montana, and can lead to poor animal performance, and even polioencepahlomalacia (a brain disorder) and death. High-sulfate water has a laxative effect and usually tastes bitter. Producers should be especially aware of water sulfate concentrations when they are feeding sulfur-containing feeds such as distiller's grains or corn gluten feed. A guide to the use of water containing sulfates is detailed below.

Sulfate (SO_4) content mg/L or ppm	**Recommendations**
Less than 1500	No harmful effects. Perhaps some temporary, mild diarrhea and discrimination against taste near upper limit.
1500-2500	No harmful effects except some temporary diarrhea, although may contribute significantly to total dietary sulfur intake. May cause a reduction in copper availability.
2500-3500	Very laxative, diarrhea usually disappears after a few weeks. Sporadic cases of sulfur-associated polio are possible. May cause substantial reduction in copper availability.
3500-4500	Very laxative. Not recommended for use for pregnant or lactating ruminants or horses, or for ruminants fed in confinement. Sporadic cases of polio likely. May cause substantial reduction in copper availability.
Over 4500	Not recommended for use under any conditions.

Excessive levels of sodium have a diuretic effect. By themselves, sodium and magnesium normally pose little risk to livestock, but their association with sulfate is a major concern. Water over 800 mg/L sodium in the presence of high sulfates would be of concern. Also, the laxative effects of high sulfate water will be more dramatic as water pH increases.

High nitrate concentrations in water can be poisonous. Just as with nitrate toxicity from forages, nitrate from water is converted to nitrite in the rumen. Nitrate interferes with oxygen transport by hemoglobin, and animals can die as a result of lack of oxygen. A guide to nitrate concentrations in water is listed below.

Nitrate-nitrogen (NO3N) mg/L or ppm	**Recommendation**
Less than 100	Should not harm livestock.
100-300	Water alone should not harm livestock. If hays, forages, or silages contain high levels of nitrate, water may contribute significantly to a nitrate problem in cattle, sheep, or horses.
Over 300	Water could cause typical nitrate poisoning in cattle, sheep, or horses, and it's use for these animals is not recommended.

Water quality is a critical nutritional factor that influences animal health, performance, and well-being. Please don't hesitate to contact me if you have questions about water sampling, testing, or interpretation of analyses.

Questions for Rachel?
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