Livestock Water Quality

Mineral/ Compound	Ideal Limits	Maximum Upper Levels	Possible Problems	Possible Sources of Contamination
Calcium (Ca)	< 50	200		Primarily dissolved limestone from soil and rock materials
Chloride (Cl)	< 70	250	High intakes of chloride influence calcium metabolism such that a calcium deficiency can occur without additional supplementation. This situation could result in milk fever.	Septic systems, road salt, fertilizers, animal waste, landfills or other wastes.
Copper (Cu)	< 0.5	0.5	Ruminants are more susceptible to copper toxicity. Problems with copper can occur when dietary molybdenum is either excessive or deficient.	Natural and corrosion of copper-containing alloys in pipe fittings.
Iron (Fe)	< .02	0.3	Ruminants are more susceptible to iron toxicity.	Natural and corrosion of pipes.
Magnesium (Mg)	< 30	90		Primarily dissolved limestone from soil and rock materials.
Manganese (Mn)	< 0.05	0.5		In domestic wastewater, industrial effluents and receiving streams.
Nitrate ($N0_3$)	< 10	100	Excessive nitrate intake can lead to problems in fetal development.	Fertilizers, pesticides and herbicides can all contribute to high nitrates.
pH	6.5-8.5	< 6.5 or < 8.5	A low pH can cause corrosive water problems. While, a pH too high can cause plumbing fixture problems.	Low values are often caused by lack of carbonate minerals from limestone in the aquifer.
Potassium (K)	< 20	100	Potassium is used to determine the DCAp value. Potassium can cause nervous system problems at very high levels (2,000 ppm).	
Sodium (Na)	< 30	150	Sodium is used to determine the DCAD of water. High concentration can be a risk for lactating and older cows, as well as young calves.	Natural and from human contamination such as septic systems, fertilizers, etc.
Total Hardness	150	350		Primarily dissolved limestone from soil and rock materials.
Sulfate ($S0_4$)	< 75	300	Sulfates interact with selenium and can lead to selenium deficiency. This can result in retained placentas which then lead to ketosis, metritis and other problems.	Natural and in mine drainage waste.
Zinc (Zn)	< 5	25	Normal growth and development of all animals requires adequate levels of dietary zinc.	Zinc usually enters the water supply from deterioration of galvanized iron and dezincification of brass.

The dietary cation-anion difference (DCAD) is important for calculating a proper feed ration. The average DCAD of water is negative (about -1.3 milliequivalents per kilogram meq/kg of water. But large ranges in cations and anions can result in DCADs being more negative or even highly positive. Water with a highly negative DCAD suggests anionic salts may not be required. However, greater feeding rates of anionic salts may be required when water has a high DCAD. A nutrition specialist can provide a farm with a proper ration that will fit their individual needs.

Mineral concentrations on a given farm can vary considerably over time. We recommenda water sample should be tested annually for mineral concentrations.