

Well Educated



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Suitability of Water for Livestock



Livestock Water Requirements

Livestock and poultry require large quantities of water to survive and perform to their maximum potential. Mammals require larger quantities of water than other animals due to their high protein diets, and ruminants require even more water for proper rumen digestion function. Feedstuffs with high water-absorbing characteristics (ie: wheat bran and alfalfa hay) increase water needs even further. For optimal livestock and poultry performance, make sure the water source is not toxic and that it is sufficiently palatable to encourage animals to drink optimal amounts.

Total Dissolved Solids (TDS)

Total dissolved solids refers to the amount of salts dissolved in the water and is expressed in milligrams per liter (mg/L). TDS levels include any dissolved salts such as carbonate, bicarbonate, sulfate, nitrates, chloride, and phosphates. Due to the nonspecific nature of TDS, it is not recommended to use these values alone to determine suitability for livestock health. The table at the right shows general guidelines for TDS concentrations, but it is best to use this table in conjunction with other parameters such as sulfates.

Species	Total Dissolved Solids (mg/L)				
	Excellent	Good	Fair	Poor	Limit
Humans	0-800	800-1,600	1,600-2,500	2,500-4,000	5,000
Horses:					
–Working	0-1,000	1,000-2,000	2,000-3,000	3,000-5,000	6,000
–Others	0-1,000	1,000-2,000	2,000-4,000	4,000-6,000	10,000
Cattle	0-1,000	1,000-2,000	2,000-4,000	4,000-6,000	10,000
Sheep	0-1,000	1,000-3,000	3,000-6,000	6,000-10,000	15,000
Poultry & Chickens	0-1,000	1,000-2,000	2,000-3,000	3,000-5,000	6,000
Swine	(young and market pigs appear to tolerate less than cattle)				

TDS Table: Adapted from NDSU Extension, Livestock and Water factsheet

Sulfates

In Montana, high TDS values are often a result of high sulfate levels, which have a recommended intake limit of 1,000 mg/L for long-term (chronic) exposure. High sulfate levels interact with copper and molybdenum and can lead to poor performance or increased incidences of polioencephelomalacia (PEM) a brain disorder. However, livestock can adapt to high saline water but abrupt changes from low to high saline water can be harmful.

Cyanobacteria

Cyanobacteria, traditionally called blue-green algae, is actually a bacteria. When large blooms of these bacteria grow in a water source, they can be severely toxic. Cyanobacteria blooms can be fatal to livestock and other animals if large amounts of infected water are ingested. Symptoms of cyanobacteria toxin poisoning in livestock range from: acute to severe diarrhea and/or vomiting, weakness, staggering, or convulsions. These bacteria have chlorophyll and use the sun as an energy source but depend on nutrients in the water for food. Minimizing the amount of nitrate and phosphorus nutrients in the water by carefully managing fertilizers and other sources of nutrients will reduce the risk of cyanobacteria blooms in your water body.



This photograph of a toxic cyanobacterial bloom has the typical appearance of a thick pool of green oil paint.

Additional Parameters of Interest in Livestock Water

Element	Short Exposure (Days – Weeks)	Chronic Exposure (Months)	Rationale
Arsenic	1 mg/L	1 mg/L	Does not seem to be a carcinogen in livestock; therefore, a concentration that protects against cytotoxic effects should be safe.
Barium	No recommendation	No recommendation	Lacks enough data.
Fluoride	2 mg/L	2 mg/L	Prevents dental lesions in most sensitive life stage. Fully mature animals may be able to tolerate more.
Molybdenum	0.3 mg/L	0.3 mg/L	Prevents secondary Cu deficiency and poor performance.
Nitrate	500 mg/L	500 mg/L	Prevents acute death and abortion in well-managed cattle. Dry diets high in NO ₃ may require lower concentrations.
Nitrite	100 mg/L	100 mg/L	Prevents acute death and abortion in well-managed cattle. Dry diets high in NO ₃ may require lower concentrations.
pH	No recommendation	No recommendation	There is considerable evidence that animals tolerate a much wider range than the commonly cited 6.5-8.5, but sufficient information could not be found to make specific recommendations.
Selenium	0.1 mg/L	0.1 mg/L	Prevents selenosis in equidae. Can probably tolerate slightly high concentrations for very short periods.
Sodium	4,000 mg/L	1,000 mg/L	Assuming normal feedstuff Na concentration and no other water sources, these concentrations should protect against acute lethality or chronically, poor performance.
Sulfate	1,800 mg/L	1,000 mg/L	Assuming normal feedstuff S concentration, acute death may occur in ruminants at concentrations greater than 2,000, <i>especially if not allowed time to acclimate</i> . Long-term consumption result in poor performance.
TDS	No recommendation	No recommendation	We do not recommend relying upon TDS to evaluate water quality for livestock and wildlife.

Summary Table. Adapted from Water Quality for Wyoming Livestock and Wildlife.

References and Additional Resources:

North Dakota State University Extension, Livestock and Water, June 2008, Greg Lardy, Charles Stoltenow, Roxanne Johnson

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South Dakota State University, Extension Extra, 2004, Jim Gerwing, Ron Gelderman, Nels Troelstrup, FS 925-E

http://www.sdstate.edu/news/publications/database/pub-details2.cfm?customel_datapageid_858688=883892&taxonomy=&searchStr=Water.Quality

Algae, Cyanobacteria and Water Quality; Agri-Food Canada

<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1189714026543&lang=eng>

Livestock and Water Quality; Agri-Food Canada

<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1259101276424&lang=eng>

Harmful Algal Blooms: Cyanobacteria

<http://www.cdc.gov/nceh/hsb/hab/default.htm>