

Livestock Water Quality Matters

Livestock require large amounts of water to reach their maximum potential. This is partly due to the fact that feed intake is directly related to water intake, but also because every physiological process within an organism requires water. As such, it is important not only that water is not toxic but also it must be palatable so that animals will drink it.

Parameter	Upper Tolerance Limit	Units	Definition
Alkalinity (Total)	2000	mg/L	Measure of the components contributing to the basicity of water
Chloride	2000	mg/L	Essential nutrient often found as a salt but dissociates in water
Nitrate + Nitrite as N	100	mg/L	Ionic forms of nitrogen that are water soluble
Sulfate	2000	mg/L	Ion that is the most common form of sulfur found in water
Total Dissolved Solids	5000	mg/L	All inorganic and organic substances dissolved in water
	Tolerance Range		
pH	6.50 - 8.50	s.u.	Measure of how acidic or basic a substance is

Why are these tests of concern?

Alkalinity and pH are directly related to each other. Water with pH less than 5.5 is acidic enough to cause acidosis in livestock leading to reduced feed intake and performance. Prolonged or sudden onset of acidosis can result in animal death. With increasing pH, the alkalinity of water increases. Excessive alkalinity can cause digestive upset in livestock, and can increase the laxative effects of water with high sulfate levels.

Chloride concentrations in water indicate the salt (sodium chloride) intake of livestock. In general, chloride affects the palatability of water, giving it a “salty” taste that animals may avoid. Excessive amounts of chloride can indicate a chance of salt toxicity that can result in dehydration, kidney failure, nervous system dysfunction, and death in extreme cases.

Nitrate or nitrite contamination in water is most often due to contact with natural minerals, agricultural runoff, or industrial processes. The consumption of high nitrate and/or nitrite levels from water prevents the transport of oxygen throughout the body and can result in sudden death in livestock or the possibility of abortion in pregnant animals. Nitrate levels in water must also be considered along with the nitrate content of feeds. Many feed sources are high in nitrate, which will add to the total intake of livestock that are drinking water high in nitrate and/or nitrite.

Waters high in **sulfates** are considered quite unpalatable. The sulfur concentrations in an animal's feed will affect the tolerance limit of sulfate in their water. Assuming normal sulfur concentration in feed, water sulfate levels below 1,800 mg/L should minimize the possibility of sudden death in cattle. Animals should be acclimated to high sulfate concentration by gradual introduction to the water source, since sudden changes in sulfate concentration (from low to high) can result in toxic doses.

Total Dissolved Solids is a non-specific test that, alone, does not typically provide enough information to determine the health effects of a water source. Significantly high concentrations of dissolved solids can affect an animal's ability to stay hydrated and may affect appetite due to the low palatability of water with high TDS. Poultry have been shown to experience decreased performance if consuming water with TDS above 1,000 mg/L.

What to do about problem water

Keeping livestock out of direct contact with a water source can be an effective means of improving and maintaining water quality. Options for controlling access include nose pumps, gravity flow reservoirs, access ramps, and solar and windmill pumping systems.

Some water quality issues can be dealt with by gradually building an animal's tolerance to the contaminant. Sulfate, for example, is generally tolerated at relatively high concentrations as long as the animal is acclimated to the high concentration. Sudden shifts from low to high levels are often the most harmful. In some cases, alterations to feed and nutrient supplements can be made that can mitigate poor water quality effects. It is recommended that a veterinarian or other professional livestock nutritionists be consulted to determine if this is a possible option.

In many cases, moving livestock to an alternate, better quality water source is often the easiest and best option for dealing with poor water quality. Alternatives to completely switching water sources include dilution of the poor quality water with better quality water; transporting clean water to the site by truck or by pipeline; or installation of water treatment systems. Unfortunately, these alternatives can be quite costly, and considerations of cost per animal per year may need to be determined.

Please note, the information provided above is for informational purposes only and is not designed to be a recommendation for any particular treatment option nor is it a complete listing of all available options. Recommended limits are from "Water Quality for Wyoming Livestock & Wildlife" provided by the University of Wyoming Department of Veterinary Sciences, UW Department of Renewable Resources, Wyoming Game and Fish Department, and Wyoming Department of Environmental Quality and literature provided through Agriculture and Agri-Food Canada.

