

Water quality: Its relationship to livestock

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Safe supplies of water are absolutely essential for livestock. If livestock do not drink enough safe water every day, intake of feed (roughages

and concentrates) will drop, production will fall and the livestock producer will lose money.

Water constitutes 60 to 70 percent of the body of livestock. Consuming water is more important than consuming food, the amount depending on the weather and the character of food consumed.

Animals should be given all the water they can drink. Those that do not drink water may suffer stress or even dehydration.

Dry cows need about 8 to 10 gallons of water daily. Cows in their last 3 months of pregnancy may drink up to 15 gallons a day. Those in milk need about five times as much water as the volume of milk produced. And calves require much more water after weaning than before. Ignoring this fact may result in a growth check in calves from which they may never fully recover.

Livestock may have health problems resulting from substandard quality water. They may drink less or may ingest mineral or organic contaminants, which can cause poor performance and nonspecific disease conditions, although no major livestock health problems

associated with water quality have been reported.

When evaluating the quality of water for livestock, consider whether livestock performance will be affected; whether water could serve as a carrier to spread disease; and whether the acceptability or safety of animal products for human consumption will be affected.

Several elements found in water seldom offer problems to livestock because they do not occur at high levels in soluble form, or because

they are toxic only in excessive concentrations. Examples are iron, copper, cobalt, zinc, iodide and manganese. These elements do not seem to accumulate in meat or milk to the extent that they would cause a problem.



The most common water quality problems affecting livestock production are:

- High concentration of minerals (excess salinity);
- High nitrogen content (nitrates, nitrites);
- Bacterial contamination;
- Heavy growths of blue-green algae; and
- Accidental spills of petroleum, pesticides and fertilizers.

Livestock tolerance of minerals in water depends on many factors: kind, age, diet and physiological condition of the animal; season; climate; and kind of salts in the water. Livestock may drink less if the water tastes

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Table 1. Recommended limits of concentration of some potentially toxic substances in drinking water for livestock.

Substance	Safe upper limit of concentration (mg/l)			
	U.S. EPA ^a (for humans)		NAS ^b	CAST ^c
	Primary	Secondary		
Arsenic	0.05		0.2	0.5
Barium	1.0		Not established	
Boron				5.0
Cadmium	0.01		0.05	0.5
Chromium	0.05		1.0	5.0
Chloride ^e		250		
Cobalt			1.0	1.0
Copper		1.0	0.5	0.5
Fluoride	4.0	2.0	2.0	3.0
Iron		0.3	Not established	No limit ^d
Lead	0.05		0.1	0.1
Manganese		0.05	Not established	No limit
Mercury	0.002		0.01	0.01
Molybdenum			Not established	No limit
Nickel			1.0	
Nitrate-N	10.0		100	300
Nitrite-N			10	10
Salinity			See Table 2	
Selenium	0.01			
Silver	0.05			
Sulfate ^e		250		
Total Dissolved Solids ^e		500		
Vanadium		0.1		1.0
Zinc	5.0	25.0		25.0

^a U.S. Environmental Protection Agency

^b National Academy of Sciences

^c Council for Agricultural Science and Technology

^d Data available are not sufficient to made definite recommendations.

^e The Texas Department of Health has different values.

From: Herrick, J.B., *Water Quality for Animals*

bad. Livestock restricted to waters with high salt content may suffer physiological upset or death.

Common compounds found in waters of excess salinity include sodium, chloride, calcium, magnesium, sulfate and bicarbonate. Bicarbonates and carbonates may contribute heavily to alkalinity (pH) levels. When feed also is high in salt, lower water salinity would be desirable. Moreover, animals consuming high-moisture forage can tolerate more saline waters than those grazing dry brush or scrub. Hard water without high salinity does not harm animals.

Sources of nitrates and nitrites include decaying animal or plant protein, animal metabolic waste, nitrogen fertilizers, silage juices and soil high in nitrogen-fixing bacteria. Nitrates and nitrites are water-soluble and may be leached away to the water table or into ponded water. Tables 1 and 2 give limits of concentrations of specific substances in water for livestock. Levels may be affected by runoff or by concentration caused by water evaporation from a pond or storage tank.

All surface waters must be assumed to carry bacteria. Keep livestock from contaminated water that has not been adequately oxygenated because of bacterial pathogens living there.

Most surface water sources have problems with algae growth as a result of high nutrient loading in runoff water. Avoid using waters bearing heavy growths of blue-green algae, as several species can produce animal

toxins (poisons). To control algae in storage tanks, reduce the introduced organic pollution and exclude light. Disinfect water storage tanks by adding 1 ounce of chlorine bleach per 30 gallons of water, holding for 12 hours before draining, and then refilling with clean water. Chlorination can also control certain bacteria.

To evaluate water quality in relation to livestock health problems, it is imperative to obtain a thorough history, make accurate observations, ask intelligent questions and submit suspected water and properly prepared tissue specimens without delay to a qualified laboratory. Obtain assistance from a local veterinarian, county Extension agent or the Texas Veterinary Medical Diagnostic Laboratory in College Station or Amarillo.

Livestock grazing operations may influence stream water quality where cattle are watered in or along the streams or drainage features. Livestock manure accumulations around water wells, ponds and stock pens, and agricultural chemicals or containers at spray pens, dipping vats and disposal sites are in some cases potential sources of localized groundwater contamination.

Other potential nonpoint pollution sources require careful site selection and management. They include open, unpaved feedlots; wastewater holding ponds; lagoons; manure stockpiles; silos; dead animal disposal sites; and onsite sewage treatment systems.

Fertilizers, including manure and wastewater, should be carefully selected

Table 2. Guide to using saline waters for livestock.

Total soluble salts content of waters (mg/l)	Comments
Less than 1,000	These waters have a relatively low level of salinity and should present no serious burden.
1,000 to 2,999	These waters should be satisfactory. They may cause temporary and mild diarrhea in livestock unaccustomed to them, but they should not affect their health or performance.
3,000 to 4,999	These waters should be satisfactory, although they may cause temporary diarrhea or be refused at first by animals unaccustomed to them.
5,000 to 6,999	These waters can be used with reasonable safety. It may be well to avoid using those approaching the higher levels for pregnant or lactating animals.
7,000 to 10,000	Considerable risk may exist in using these waters for pregnant or lactating livestock, the young of these species, or for any animals subjected to heavy heat stress or water loss. In general, their use should be avoided, although older livestock may subsist on them for long periods under conditions of low stress.
More than 10,000	The risks with these highly saline waters are so great that they cannot be recommended for use under any conditions.

From: NAS, *Nutrients and Toxic Substances in Water for Livestock and Poultry*

and applied to land in strict accordance with soil and crop requirements. This will help prevent contaminating underlying aquifers with such nutrients as nitrate, ammonia, potassium or such salts as chloride. Always apply pesticides at rates recommended on the label. Do not apply them to vulnerable sites or during unfavorable climatic conditions that can increase environmental risks.

Locate wells at least 150 to 300 feet from livestock corrals, septic tanks, manure treatment lagoons and runoff holding ponds. To prevent infiltration, case and grout wells down to a restrictive layer or to the water table, and seal around the wellhead with a concrete pad. Wellhead protection measures are spec-

ified in water well drillers' guidelines.

Generally speaking, animal health problems usually are NOT caused by poor water quality. Water-related health problems in livestock are usually stress problems caused by an inadequate water supply or by unpalatable water with a high level of dissolved substances.

Protect livestock from dangerous drinking water by providing alternative sources of safe water. Adequate rain dilutes dangerous surface waters. Livestock producers should provide sufficient safe water for animals by preventing contamination, minimizing evaporation and providing enough sources of supply year-round.

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