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Livestock Drinking Water Quality

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Quick Facts...

- Test livestock drinking water for salinity and toxic elements if water quality is not known.
- Take a representative water sample for any testing.
- The National Academy of Sciences proposes general guidelines for use of saline waters and for upper limits of toxic ions in water. There are no easy answers or quick fixes for toxic water problems.

Excessive salinity in livestock drinking water can upset the animals' water balance and cause death. High levels of specific ions in water can cause animal health problems and death. The National Academy of Sciences offers upper limits for toxic substances in water (Table 1). It also offers guidelines for use of saline waters for livestock and poultry (Table 2).

Unsafe levels of salts and ions depend on the amount of water consumed each day and the weight of the animal. Test livestock drinking water for salinity and toxic elements if water quality is not known. The general guidelines presented in Tables 1 and 2 include an appropriate margin of safety. For a more specific interpretation of livestock drinking water quality, contact your veterinarian.

To obtain a representative water sample for testing, collect approximately 1-pint samples at random intervals using clean glass or plastic containers. Pour small samples into a large container and mix thoroughly. Take the final sample from the mixed large container. Avoid taking the sample from inactive wells or directly after drilling. Thoroughly pump or bail wells before sampling.

If the test report shows that water contains toxic substances exceeding the upper limit guidelines listed in Tables 1 and 2, treatment may be necessary before livestock drink the water. However, there usually are no simple answers or quick fixes for toxic water problems. In many cases, water treatment may be impractical or too costly. Some circumstances may warrant the use of ion-exchange filters, distillation or dilution to correct the problem. Consultation with a sanitary engineer or water treatment specialist on a case-by-case basis is the best recommendation.

Table 1: Recommendations for levels of toxic substances in drinking water for livestock.

Constituent	Upper limit	Constituent	Upper limit
Aluminum (Al)	5.0 mg/L	Lead (Pb)	0.1 mg/L ¹
Arsenic (As)	0.2 mg/L	Manganese (Mn)	no data
Beryllium (Be)	no data	Mercury (Hg)	0.01 mg/L

Boron (B)	5.0 mg/L	Molybdenum (Mo)	no data
Cadmium (Cd)	0.05 mg/L	Nitrate + nitrite (NO ₃ -N + NO ₂ -N)	100 mg/L
Chromium (Cr)	1.0 mg/L	Nitrite (NO ₂ -N)	10 mg/L
Cobalt (Co)	1.0 mg/L	Selenium (Se)	0.05 mg/L
Copper (Cu)	0.5 mg/L	Vanadium (V)	0.10 mg/L
Fluorine (F)	2.0 mg/L	Zinc (Zn)	24 mg/L
Iron (Fe)	no data	Total dissolved solids (TDS)	10,000 mg/L ²

¹Lead is accumulative and problems may begin at threshold value=0.05 mg/L.
²See Table 2.

Sources: Environmental Studies Board, Nat. Acad. of Sci., Nat. Acad. of Eng., *Water Quality Criteria*, 1972.
Ayers, R.S. and D.W. Westcot. *Water Quality for Agriculture*. Food and Agriculture Organization of the United Nations, Rome, 1976.

Table 2: Guide to the use of saline waters for livestock and poultry.	
Total soluble salts content of waters	Uses
Less than 1,000 mg/L (EC < 1.5 mmhos/cm)	Relatively low level of salinity. Excellent for all classes of livestock and poultry.
1,000-3,000 mg/L (EC = 1.5-5 mmhos/cm)	Very satisfactory for all classes of livestock and poultry. May cause temporary and mild diarrhea in livestock not accustomed to them; may cause watery droppings in poultry.
3,000-5,000 mg/L (EC = 5-8 mmhos/cm)	Satisfactory for livestock, but may cause temporary diarrhea or be refused at first by animals not accustomed to them. Poor waters for poultry, often causing watery feces, increased mortality, and decreased growth, especially in turkeys.
5,000-7,000 mg/L (EC = 8-11 mmhos/cm)	Can be used with reasonable safety for dairy and beef cattle, sheep, swine, and horses. Avoid use for pregnant or lactating animals. Not acceptable for poultry.
7,000-10,000 mg/L (EC = 11-16 mmhos/cm)	Unfit for poultry and probably for swine. Considerable risk in using for pregnant or lactating cows, horses or sheep, or for the young of these species. In general, use should be avoided although older ruminants, horses, poultry, and swine may subsist on them under certain conditions.
Over 10,000 mg/L (EC > 11-16 mmhos/cm)	Risks with these highly saline waters are so great that they cannot be recommended for use under any condition.

Sources: Environmental Studies Board, Nat. Acad. of Sci., Nat. Acad. of Eng., *Water Quality Criteria*, 1972. Ayers, R.S. and D.W. Westcot. *Water Quality for Agriculture*. Food and Agriculture Organization of the United Nations, Rome, 1976.

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