drought tips

Number 92-30

Assessing Water Quality for Livestock Under Drought Conditions

Unless livestock have access to an adequate supply of safe water every day, they may reduce feed intake, thereby lowering production and causing an economic loss to the livestock owner.

An animal's water requirement is influenced by weight, rate and composition of weight gain, pregnancy, lactation, activity, type of diet, feed intake, and environmental temperature. Cows generally require about 10 gallons of water daily, but during the last 3 months of pregnancy, require about 15 gallons of water each day. Lactating cows need 10 to 16 gallons or more of water daily, depending on the volume of milk produced. Calves require 4 to 10 gallons daily, depending on feed, climate, and whether they are still suckling.

Following are the most common water quality problems affecting livestock production:

- high concentrations of minerals (excess salinity);
- high nitrogen content (nitrates and nitrites);
- heavy blue-green algae growth;
- bacterial contamination;
- accidental spills of petroleum, pesticides, and fertilizers.

The relative tolerance of livestock for minerals in water depends on the animal species, age, diet, season, climate, types of salts present in the water, and physiological condition of the animal. Lack of palatability may result in poor acceptance of water by the animal and lower intake of water.

Some elements found in water rarely cause problems for livestock because they do not occur at high levels in soluble form or because they are toxic only in excessive concentration. Examples of these elements are iron, molybdenum, chromium, beryllium, aluminum, boron, copper, cobalt, zinc, iodine, and manganese.

Because arsenic, cadmium, fluorine, lead, selenium, and mercury may present a special hazard to livestock, these elements should be evaluated on an individual case basis.

Livestock restricted to water with high salt content may also suffer health problems. Common ions in highly saline waters are calcium, magnesium, and sodium in the bicarbonate, chloride, or sulfate form. Tables 1, 2, 3, and 4 provide guidelines for safe concentrations of specific substances in water for livestock.

Livestock owners should avoid using water with heavy blue-green algae growth, since several species are capable of producing toxins. The introduction of organic matter should be limited and light excluded to control algae growth in storage tanks.

To evaluate water quality in relation to livestock health problems, properly prepared samples of suspected water should be submitted to a qualified laboratory. Local veterinarians or the University of California livestock farm advisor can provide assistance in preparing samples, locating a laboratory, or interpreting results.

References

Carlson, T.L., 1987. *Water Quality for Livestock Proceedings, 1987*. Meetings of the American Feed Industry Association.

Love, K. and Thomas, J., 1983. *Water Supplies for Sheep*. Agnote, Department of Agriculture, Australia.

Faires, F.C.; Sweeton, J.; and Reagor, J.S., 1989. *Water Quality: Its Relationship to Livestock*. Texas Agricultural Extension Service.

National Research Council, 1984. *Nutrient Requirements of Beef Cattle*. Washington DC: National Academy of Sciences.

Smith, G.S. *Quality of Water for Livestock*. New Mexico State University, Livestock Feeders Report.

Authors: J.R. Dunbar and R.O. Miller

Table 1. Safe levels of potentially toxic nutrients in water for cattle.

element	Maximum safe concentration (p/m)
Aluminum	5.0
Arsenic	0.2
Boron	5.0
Cadmium	0.05
Cobalt	1.0
Copper	0.5
Lead	0.1
Mercury	0.01
Nitrate-N	100.0
Nitrite-N	10.0
Selenium	0.05
Sulfate-s	1000.0
Vanadium	0.1

SOURCE: J.B. Herrick, 1982. National Academy of the Sciences, Washington, DC

Table 2. A guide to the use of saline waters for livestock

Total soluble salt content of waters (mg/L)	Comments
Less than 1,000	These waters have relatively low levels of salinity and should present no serious burden.
1,000 to 2,999	These waters should be satisfactory. They may cause mild temporary diarrhea in livestock not accustomed to them, but should not affect 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 not accustomed to them.
5,000 to 6,999	These waters can be used with reasonable safety, but should be avoided for pregnant or lactating animals.
7,000 to 10,000	Considerable risk may exist in using these waters for pregnant or lactating livestock, calves, or animals subjected to heavy heat stress or water loss. Use of these waters should be avoided, although older livestock may subsist on them for long periods of time under conditions of low stress.
More than 10,000	The risks of these highly saline waters are so great that they cannot be recommended for use under any conditions.

SOURCE: National Academy of the Sciences, 1974. *Nutrients and toxic substances in water for livestock and poultry*.

Table 3. Nitrate/nitrite concentrations in water for cattle

Concentration	Comments
more than 50 p/m	May be unsafe for very young animals. Pregnant or lactating animals may show greater sensitivity than other animals.
less than 100 p/m	Generally safe level of nitrate or nitrite. Consideration should be given to nitrate content of feed, since the effects are additive within the animal. Rarely is nitrate concentration > 4 p/m.

Table 4. Maximum allowable pesticide concentrations in drinking water

Pesticide	Maximum allowable concentrations
Lindane	0.004 p/m
2,4D	0. 1 p/m

SOURCE: U.S. Environmental Protection Agency, 1975.

drought tips is a publication series developed as a cooperative effort by the following organizations:

California Department of Water Resources, Water Conservation Office
University of California (UC)
UC Department of Land, Air and Water Resources
USDA Drought Response Office
USDA Soil Conservation Service
USDI Bureau of Reclamation, Mid-Pacific Region

Published 1993