

## Introduction

Water is a critical nutrient to all livestock and poultry. As with feed ingredients, livestock water should meet the nutritional needs of the animal. Most minerals and dissolved solids found in water provide nutritional benefits when present within limited concentration ranges. This guide outlines the recommended limits of certain substances commonly found in water used for livestock and poultry.

With the exception of the salinity recommendations, these standards do not discriminate between animals raised for slaughter or those kept for breeding or pleasure. It is possible that animals maintained for long periods on water of marginal quality would be at risk of developing related health problems. Slaughter animals, which are kept for relatively shorter periods, would be less likely to develop health problems from water of the same quality.

Without proper blood and tissue tests, it is often difficult to determine that animal health problems are caused by mineral toxicity because of the complex metabolic interactions of dietary minerals. Toxicity from a specific mineral or compound is a function of its concentration and relative levels of other components with which it interacts. The concentrations below indicate general water quality conditions and possible related health problems. They should not be used as sole diagnostic indicators.

## Salinity

Salinity, or the total dissolved salt content of water, is a problem commonly found in arid regions such as New Mexico. Treatment to reduce salinity is possible, but it requires regular maintenance and may not be economically feasible for remote watering locations.



### Suggested salinity level limits for different classes of livestock are as follows:

- **Less than 1,000 milligrams per liter (mg/L).** Considered low. Excellent for all classes of livestock and poultry.
- **1,000–2,999 mg/L.** Very satisfactory for all classes of livestock and poultry. Temporary, mild diarrhea in livestock or watery droppings in poultry may be noticed in animals not accustomed to this level of salinity.
- **3,000–4,999 mg/L.** Satisfactory for livestock; poor water for poultry. Livestock not used to saline water may refuse it or have temporary diarrhea. In poultry, watery droppings, increased mortality, and increased morbidity associated with poor growth may occur. Turkeys are particularly susceptible.

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- **5,000–6,999 mg/L.** Marginal quality for beef cattle, sheep, swine, and horses. Water this saline should not be used for pregnant or lactating animals, and it is not suitable for poultry.
- **7,000–10,000 mg/L.** Unfit for poultry and swine. Considerable risk for pregnant or lactating cows, horses, sheep, or immature animals of any class. Avoid use for all animals if possible; however, older animals may subsist on water of this quality under certain conditions.
- **Over 10,000 mg/L.** Because of high risks associated with such saline water, regard it as unusable under any condition.
- **Selenium: MCL 0.05 mg/L.** Selenium is not commonly a problem; however, certain areas in New Mexico have high levels of selenium in the soil, which could cause high levels in groundwater. Too much selenium can cause “blind staggers” or “bob-tailed disease,” leading to loss of mane and tail in horses, switch of cattle, and body hair of swine. Affected animals may recover if removed quickly from the contaminated water source.
- **Fluoride: No MCL** is given, although a limit of 2.0 mg/L is recommended. Fluoride interacts with copper in dietary minerals. Excessive levels can cause loss of tooth enamel, resulting in rapid, uneven wear. Secondary effects disturb metabolism, causing semi-starvation conditions.

## Sulfate

Suggested sulfate levels for cattle are as follows:

- **Less than 500 mg/L.** Considered safe for all ages and types of cattle.
- **500–1,499 mg/L.** Generally safe. Trace mineral availability may begin to be reduced. May decrease performance of confined cattle.
- **1,500–2,999 mg/L.** Marginal. Can cause temporary diarrhea. May be considered poor for confined cattle during hot weather. Sporadic cases of polio may be seen in confined cattle. Performance may be reduced.
- **3,000–4,000 mg/L.** Poor water. Not recommended for use for pregnant or lactating cows or cattle in confinement. Sporadic cases of polio are probable, especially in confined cattle. Performance of grazing cattle may be affected.
- **More than 4,000 mg/L.** Dangerous. Health problems and substantial reduction in performance are expected.
- **Arsenic: MCL 0.2 mg/L.** Elevated levels can produce antibiotic-like effects such as growth stimulation (as with medicated poultry feeds). Arsenic is, however, stored by the body and can reach acute toxicity levels, causing death.
- **Copper: MCL 0.5 mg/L.** In combination with phosphorus, copper plays a role in bone development. Ruminants are more susceptible to copper toxicity. Problems with copper can occur when dietary molybdenum is either excessive or deficient.
- **Nitrate-N: MCL 100 mg/L.** Nitrate contamination of well water is often caused by poor wellhead protection from animal waste. High nitrate levels may also indicate high levels of biological pathogens (bacteria that can cause gastrointestinal disease). Recommended MCL for nitrite-N is 10 mg/L. Excessive nitrate/nitrite intake can lead to problems in fetal development.
- **Cadmium: MCL 0.05 mg/L.** Cadmium is considered very toxic. High levels in the diets of poultry have caused egg production to cease. In young animals, increased dietary intake of cadmium can cause anemia. Reproductive problems related to cadmium have been observed in most livestock classes.
- **Boron: MCL 5.0 mg/L.** Little scientific information on livestock boron intake is available. Slower growth rate is known to be one of the effects of too much boron in livestock water. Higher levels (150–300 mg/L) can cause inflammation and edema in the legs of cattle, causing subsequent weight loss.

## Elements and Compounds

Levels of nitrates, metals, and other elements in water are also important to consider for livestock and poultry suitability. For each component, the Maximum Contaminant Level (MCL) indicates the uppermost limit at which water should be considered safe to use. MCLs are given in milligrams per liter (mg/L). Some water testing results may report these substances in parts per million (ppm). For practical purposes, mg/L can be considered numerically equivalent to ppm.

- **Chromium: MCL 1.0 mg/L.** Carbohydrate metabolism in animals requires dietary chromium. Chromium toxicity from diet has been studied very little and is not considered a serious problem. Symptoms of elevated chromium intake vary among classes of animals, but primarily appear as skin and soft tissue problems.
- **Lead: MCL 0.1 mg/L.** It is unusual to find lead in natural waters. Studies indicate pregnant goats will abort fetuses as a result of moderate levels of lead intake. In poultry, egg production has been shown to decrease from increased lead intake.
- **Mercury: MCL 0.01 mg/L.** Mercury is not essential to animal nutrition and is not readily absorbed. Mercury can cause acute poisoning, much the same as arsenic. In cattle and sheep, dietary intake of 0.2 mg of mercury per kilogram of body weight will cause incoordination, unsteady gait, and eventual death.
- **Zinc: MCL 25 mg/L.** Normal growth and development of all animals requires adequate levels of dietary zinc. Levels of 40–100 mg/L zinc in the diet are normal.

## Water Testing

Have your well water tested annually. Owners of private wells can have their water tested by collecting a sample themselves or hiring a qualified professional. The sample should be taken to a certified laboratory for analysis. For water testing labs near you, contact your local county Cooperative Extension Service office (<http://aces.nmsu.edu/county/>).

If water test results do not meet the recommended quality standards, take steps to determine the source of the problem. A county Extension agent or a qualified private water quality consultant can assist in locating and correcting the cause. Another resource is NMSU Extension's New Mexico Farm\*A\*Syst–Farmstead Assessment System (<http://aces.nmsu.edu/farmasyst/>). This is a self-administered groundwater protection program that helps identify problem areas and recommends solutions. Information on water testing can be found in Farm\*A\*Syst Fact Sheet 1 at <http://aces.nmsu.edu/farmasyst/pdfs/1fact.pdf>

## References

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