



# GUIDE TO UNDERSTANDING LIVESTOCK WATER ANALYSIS

## Total Dissolved Solids (TDS):

Total Soluble Salts Content of Water	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. <b>Not acceptable for poultry.</b>
7,000-10,000 mg/L (EC = 11-16 mmhos/cm)	<b>Unfit for poultry and probably for swine.</b> 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.

## Nitrates:

Water analyses reports nitrates and nitrites together. Nitrate toxicity resulting exclusively from water is rare, but is primarily of concern when combined with forages having high nitrate levels. Nitrates themselves are not very toxic, but bacteria in ruminant animals (dairy and beef cattle) will convert the nitrates to nitrite that reduces the blood's ability to metabolise oxygen and effectively causes shortness of breath and eventual suffocation.

Nitrate + Nitrite as N (ppm)	Comments
<100	Experimental evidence indicates that this water should not harm livestock or poultry.
100-300	Should not harm livestock by itself, but may cause problems when combined with feeds containing nitrates. Cause for concern increases at higher levels, especially during periods of drought.
>300	This water could cause typical nitrate poisoning in cattle, sheep, or horses, and its use for these animals is not recommended. Because this level of nitrate contributes to the salt content in a significant amount, the use of this water for swine or poultry should be avoided.

## Alkalinity:

Waters with alkalinities of less than 1,000 ppm are considered satisfactory for all classes of livestock and poultry. Above that concentration they are probably unsatisfactory, although for adults they may do little harm at concentrations less than about 2,500 ppm unless carbonates are present in excess over bicarbonates.

## **Hardness:**

Concentration of calcium and magnesium contributes to hardness. Hard waters have often been suggested as a cause of urinary calculi (kidney stones or water belly). Experimental evidence shows that this is not true, however, and hardness might, in fact, actually contribute to the prevention of certain types of calculi formation.

## **Sodium:**

Sodium should be maintained below 1000, but the maximum level of sodium livestock can tolerate is 2000 ppm.

## **Sulfates:**

Although sulfates can have a laxative effect, there is limited data available regarding their overall effect on livestock health and productivity. It is generally felt that the presence of sulfates should seldom be a problem in livestock water. However, in some rare cases involving very saline water, producers have lost cattle due to a sulfate-related problem.

<b>Sulfate Content, (ppm)</b>	<b>Comments</b>
<1500	No harmful effects except some temporary very mild diarrhea near upper limit.
1500-2500	No harmful effects except some temporary diarrhea. In cattle, this water may contribute significantly to the total dietary sulfur intake.
2500-3500	Poor water for poultry, especially turkeys. Very laxative, causing diarrhea in livestock that usually disappears after a few weeks. In cattle, this water may contribute significantly to total dietary sulfur intake.
3500-4500	Very laxative. Not recommended for use for pregnant or lactating cows, cattle in confinement, horses, or sheep. Unacceptable for poultry. In cattle, this water may contribute significantly to the total dietary sulfur intake.
>4500	Not recommended for use under any conditions.

## **Maximum Recommended Concentrations for Livestock Use:**

<b>Parameter</b>	<b>Concentration</b>
pH	6-5-8.5
Total Dissolved Solids (TDS)	3000 ppm
Hardness	1000 ppm
Nitrate + Nitrite as N	100 ppm
Calcium	1000 ppm
Magnesium	800 ppm
Sodium	1000 ppm
Alkalinity	1000 ppm
Sulfates	1000 ppm

**Note:** parts/million (ppm) = milligram/liter (mg/L), millimhos/cm (mmhos/cm) = decisiemens/m (dS/m)

## **Sources:**

National Research Council. 1974. Nutrients and Toxic Substances in Water for Livestock and Poultry, National Academy Press.  
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