



WATER QUALITY

for livestock

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Fresh, clean water is a daily requirement of all classes of livestock. In fact, water is the most essential nutrient for livestock health and production. Animals need water to help them regulate body temperature, digest food, lubricate joints, grow muscle, and to carry out almost every other biological body process.

Water quality may be impaired by contaminants such as salts, excessive nutrients, or bacteria, which can become more concentrated during drought as water sources dry up. Most contaminants will cause animals to drink less water, which causes them to eat less, negatively impacting health and production. However, if livestock water (or food) contains a high amount of salt, animals may drink more water because salty water doesn't fully quench thirst. This is why testing to know what is in animals' drinking water is extremely important for livestock production.

Water samples can be sent to commercial labs to analyze for parameters such as: total dissolved solids (TDS), sodium, calcium, magnesium, chloride, nitrate-nitrogen, pH, iron, copper, and conductivity. TDS is a common concern for livestock producers as it is a measure of the minerals, salts, metals, and other ions dissolved in water. Increased concentrations of TDS can cause aversion to the water source and/or illness, but TDS does not indicate the specific dissolved solid that may cause additional issues.

Concentrations of TDS may change throughout the year. Figure 1 demonstrates the fluctuations in TDS levels in three water sources in southeastern Montana. Based on these results, water source one would not provide suitable livestock drinking water during most of the summer and fall. The variability of results throughout summer and fall illustrate the importance of testing water sources immediately before and during livestock use. TDS can be estimated

in the field using a simple meter that measures specific conductance. These meters can be purchased for as little as \$15. More complex meters are also available for purchase at an increased cost. Table 1 lists some effects of increasing TDS concentrations in livestock drinking water.

Water with high TDS may also have high concentrations of sulfates or nitrates. High sulfate water tastes bitter and livestock may drink less water than needed to remain healthy. High sulfate concentrations in water can also lead to polioencephalomalacia (polio). Livestock owners should be especially aware of water sulfate concentrations when feeding high-sulfur feedstuffs, such as distillers grains or corn gluten feed, because the combination of sulfates in water and sulfates in feed can be toxic to livestock, similar to high levels of nitrates in water and feed sources (refer to BSSA Fall 2014 for more information on nitrate toxicity (<http://msuextension.org/magazine/articles/264>)). High-sulfate water is also a concern when livestock are consuming feeds that contain high concentrations of the trace mineral molybdenum. It may be necessary to supplement cattle with copper when consuming feed high in molybdenum and sulfur and drinking water high in sulfates. Currently, MSU Extension faculty in Custer, Fallon and Carter counties can test water samples in their offices to estimate sulfate concentration. Table 2 provides recommendations for safe sulfate levels in livestock drinking water.

Finally, bacteria are another common water contaminant that can depress livestock health. High bacteria concentrations in livestock drinking water can cause infertility, foot rot, and low milk production. Manure getting into stagnant water sources is a common source of bacteria and can

contribute to blue-green algae problems, which can be toxic to livestock. Blue-green algae will bloom during hot weather and calm winds. The only prevention of poisoning by blue-green algae is to keep livestock from consuming the contaminated water source. Blue-green algae blooms form on the water surface and cannot be picked out and removed from the water source like a typical green-algae. Additionally, leptospirosis and fusobacterium can contaminate water and mud. Leptospirosis is spread through urine and can rapidly move through a herd. Fusobacterium causes foot rot, which is spread on hooves, and can contaminate other sources of ground water. For these reasons, minimizing manure reaching water sources will improve livestock health.

In summary, water quality is crucial to maintaining livestock production and health. Water quality differs throughout the year even from the same source and is greatly impacted by weather events such as drought

or heavy rainfall. Information gained from periodic water tests for TDS, sulfates, nitrates, and bacteria can help livestock owners to be good livestock stewards. Contact your local MSU county or reservation Extension office for water quality tests available in-house and testing laboratory contact information. ■

FIGURE 1. Total dissolved solids (TDS) at three water sources in southeastern Montana during summer-fall 2014.

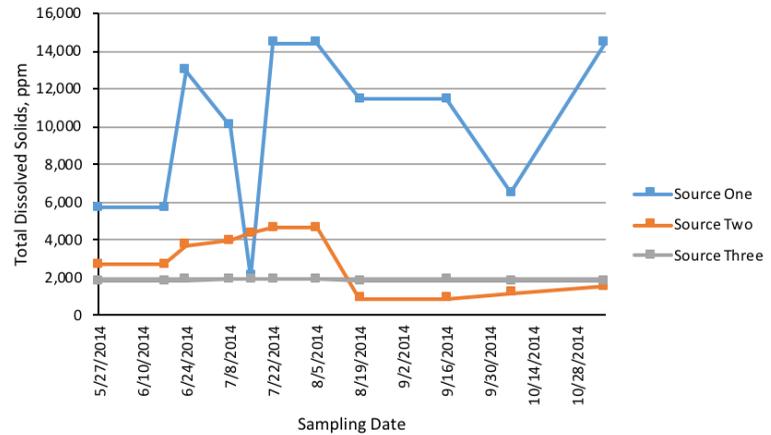


TABLE 1. Recommended use of livestock drinking water that contains total dissolved solids (TDS).

TDS Content (ppm)	Recommendations
<1,000	Low levels, excellent source of water for livestock.
1,000 to 2,999	Satisfactory for all livestock; may cause mild diarrhea in livestock; no effect on health or performance.
3,000 to 4,999	Satisfactory for livestock; may cause temporary diarrhea; may be refused by livestock not accustomed to it.
5,000 to 6,999	Reasonably safe for livestock; avoid using with pregnant or lactating animals.
7,000 to 10,000	Not safe for pregnant or lactating cows, horses, and sheep; not safe for young animals or animals with increased heat stress or water loss; use should be avoided; older livestock may consume if under low stress.
>10,000	HIGH RISK; DO NOT USE UNDER ANY CONDITIONS

TABLE 2. Recommended use of livestock drinking water that contains sulfates.

Sulfate Content (ppm)	Recommendations
< 1500	No harmful effects. May be temporary refusal of water close to upper limits
1500 to 2500	May have temporary diarrhea. May contribute significantly to total sulfur intake and cause a reduction in copper availability.
2500 to 3500	Laxative effects, diarrhea will usual disappear after a few weeks. May have sporadic cases of sulfur-associated polio. Can cause a significant reduction in copper availability.
3500 to 4500	Laxative effects. Do not use for pregnant or lactating ruminants or horses, or ruminants fed in confinement. Sporadic cases of sulfur-associated polio are likely. Significant reduction in copper availability.
> 4500	Do not use for livestock under any conditions.

TABLE 3. Recommended use of livestock drinking water that contains nitrate.

Nitrate Content (ppm)	Recommendations
< 100	Safe for livestock.
100 to 300	Water is safe for livestock. However, if hays, forages, or silages have high nitrate concentrations, water may contribute significantly to nitrate problem.
> 300	Water could cause nitrate toxicity in cattle, sheep, or horses. Do NOT use for livestock.