



LIVESTOCK WATER QUALITY

STORY IN BRIEF

Water is the most important nutrient for range cattle. It is required for all life processes. A loss of 20 per cent of the body's water will be fatal. Total body water of cattle is 56 to 81 per cent of body weight. Physiologic stage and body composition **affects the body's water content. Lactating cows possess the greatest amount of body water (from 62 to 69%). Fat cows** contain less water than thin lactating cows and younger animals have higher water content than older animals.

Loss of body water occurs through milk production, fecal excretion, urine excretion, sweat and vapor loss. Water losses **through milk production are equal to approximately 33% of the cow's daily consumption. Fecal losses are usually** comparable to milk losses and urinary losses are approximately 50% of fecal losses. Fecal water losses are affected by intake, dry matter content of the diet and digestibility. Urinary losses range from 1 to 9 gallons per day. Urinary water excretion is related to water availability, water absorbed, nitrogen and potassium content of urine and dry matter content of the diet.

Water intake - Cattle can meet their water requirement from 3 sources;

- Drinking free water
- Ingestion of water contained in feed
- **Water produced by the body's metabolism**

It has been estimated that cows;

- require 2.6 to 3.0 lbs of water for every lb of milk produced
- in moist pastures cattle may consume only 40% by drinking
- Salt availability influences consumption
- High salt or protein may stimulate water consumption. For every gram of sodium consumed (28 grams=1 ounce) water intake generally will increase 0.1 lb.

Water is especially important during periods of heat stress.

- Properties for cooling include heat conductivity and vaporization
- As effective temperatures raises from 65 to 86 F consumption increases by 30%
- Losses from urine, sweating & respiration increases 15, 59 and 50% with temperature increases
- No shade during the summer will increase water consumption by 18%

Water quality - Five criteria might be combined to encompass the characteristics of water quality. They are;

- 1.Odor and taste
- 2.Chemical properties (pH, dissolved solids, total dissolved oxygen and hardness)
- 3.Toxic compounds (heavy metals, toxic minerals, organophosphates and hydrocarbons)
- 4.Presence of excess minerals (nitrates, sodium, sulfate and iron)
- 5.Presence of living organisms (bacteria)

Salinity—total dissolved solids (TDS) expressed as mg/liter or parts per million (ppm). This is a measure of total dissolved salts;

- sodium chloride, carbonates, nitrates, sulfates, calcium, magnesium and potassium.



The primary symptom of high salinity water is diarrhea. If the TDS is high, cattle will be reluctant to drink then, drink a large amount at once. This can cause the animal to become very sick and potentially die. Guidelines are;

- Less than 1000 ppm. Generally safe.

- Greater than 1000 ppm. May cause some diarrhea. May reduce availability of other minerals. May reduce performance.
- 3000 to 5000 ppm. Marginally safe. Maybe reluctant to drink. May reduce performance and affect health. Should also test for sulfates.
- 5000 to 7000 ppm. Poor water. Performance and health slump especially when temperatures are high. Test for sulfates. Use with low value stock
- 7000 plus ppm. Unsuitable. Performance and health effects expected. Limit use with lactating and pregnant stock. Sulfates mostly likely high

Sulfates — commonly high in ground water in South Dakota and Montana. Adult cattle seem to be more resistant to the effects of sulfates than calves. Sulfates can cause secondary deficiencies of;

- copper, zinc, iron and manganese.

The form of the sulfates can vary. All forms are a laxative.

- They will drink less, have diarrhea at a lower sulfate concentration with sodium.
- 2,000+ppm diarrhea may start but cattle will adapt.
- Most common forms are sodium sulfate and magnesium sulfate.
- Iron sulfate may cause the most severe rejection of drinking water. Guidelines for interpretation of sulfate results;



- Less than 500 ppm. Safe.
- 500 to 1500 ppm. Generally safe. Trace mineral availability may be reduced. Decreased performance of confined cattle.
- 1500 to 3000 ppm. Marginal. Poor for confined cattle during hot weather. Sporadic cases of polio may be seen in confined cattle. Performance maybe reduced.
- 3000 to 4000 ppm. Poor water. Sporadic cases of polio are probable, especially in confined cattle. Performance of grazing cattle maybe affected.
- 4000 plus ppm. Dangerous. Health problems expected. Reduction in performance.

Results of studies evaluating water quality on cattle performance – Two South Dakota studies were conducted with yearling cattle in



pens fed a roughage diet. Three groups of cattle received different quality of water

- 1.Good – 400ppm sulfate/1000ppm TDS
- 2.Poor – 3100ppm sulfates/4800ppm TDS
- 3.Poorer- 3900ppm/6200ppm TDS

Steer average daily gain declined from 1.4 lb to 1 lb per day.

The steers drinking the 3100 and 3900ppm sulfate water had;

- reduced water intake, dry matter intake feed efficiency
- 15% of the cattle on the high sulfate water exhibited polio.
- daily sulfur content of diet was 0.27, 0.74 and 0.93%. Requirement is near 0.2%.

In another set of studies steers had access to four sources of water with either;

- 1.400ppm sulfates/1000ppm TDS
- 2.1700ppm sulfates/3000ppm TDS
- 3.2900ppm sulfates/5000ppm TDS
- 4.4600ppm sulfates/7000 TDS.

Steer gains were 1.8, 1.6, 1.5 and 0.6 lbs per day for each sulfate treatment (400, 1700, 2900 and 4600 ppm).

47% of steers on the two highest sulfates levels had symptoms of polio and 33% died.

Summary

Water quality especially sulfates can affect animal gain and health. If animal performance is disappointing a water analysis may be indicated. Start with a TDS analysis. If the concentration is over 3000ppm TDS, then further analysis of sulfates should follow. Research shows that cattle prefer to drink out of troughs rather than the dirt tanks. Knowledge and management of stock water quality can be an important part of an effective ranch plan.

