# QUALITY WATER FOR QUALITY CATTLE

by Käte van der Walt

The recent drought has certainly taken a toll on animals, pastures, crops, and water sources. Although many producers are concerned about low stocks of stored feeds, it is important to remember the importance of water as a nutrient. Animal performance depends heavily on adequate water intake and quality. Drought conditions can potentially affect all sources of water, including groundwater, but surface waters are especially vulnerable.

During high rainfall periods, a decline in water quality can result from an increase in run-off, and while the water will carry higher levels of nutrients, it will also contain more pathogens and pollutants. Similarly, when drought conditions persist and groundwater reserves are depleted, the residual water that remains is often of inferior quality. This is as a result of the seepage of saline or contaminated water from the land surface or the adjacent water bodies that have highly concentrated quantities of contaminants. This occurs because decreased precipitation and run-off results in a concentration of pollutants in the water, which leads to an increased load of microbes in waterways and drinking-water reservoirs. Increased water temperature causes water degradation, which leads to a bloom in microbial populations.

Good-quality water can be defined by a number of factors including taste, smell, turbidity, electrical conductivity and the presence or absence of bacteria and other harmful substances. That is why it is important to monitor water quality at least twice a year. After good rains, the quality of the water will change and it is necessary to test the water again and make adjustment to the feeding programme. Basic water quality parameters such as total dissolved solids (TDS), blue-green algae, pH and mineral levels will give good indications of the quality of the water being supplied to the animals.

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**Table 1** Safe levels for basic water quality parameters (source: Morgan, SE, 2011. Water Quality for Cattle, *Veterinary Clinics of North America: Food Animal Practice*, Volume 27, Issue 2)

| Parameter | Acceptable range |
|---|---|
| TDS | <1000 mg/ℓ is ideal, although higher levels may be tolerated |
| Nitrate | <100 mg/ℓ or <400 mg/ℓ in a well-managed herd |
| Nitrite | <33 mg/ml |
| Sulphate | 500 mg/ℓ<br><1000 mg/ℓ is the maximum safe level for cattle exposed to moderate dietary sulphur levels or high ambient temperatures. |
| Chloride | Dairy cattle: 1 600 mg/ℓ<br>Beef cattle: 4 000 mg/ℓ<br>Ewes and lambs: 2 400 mg/ℓ<br>Adult dry sheep: 5 600 mg/ℓ |
| pH | 5,5 to 9,0 |

## Measure your water quality

### 1. Total dissolved solids (TDS)

TDS are all of the organic and inorganic substances in water that can pass through a two-micron filter. During a drought, the TDS can reach levels that negatively affect water intake due to palatability and toxicity problems. If TDS exceed 7 000 ppm, an alternate water source needs to be considered.

### 2. Blue-green algae

The presence of sediment, manure and urine all promote a favourable environment for algae and bacteria. During periods of hot and dry conditions, rapid proliferation of blue-green algae (cyanobacteria) in water is more common. Increases in the population of blue-green algae result in noticeable bluish-greenish “blooms”. Stagnant water conditions and high levels of nutrients increase the potential for bloom formation. Blue-green algal blooms can reduce water quality and intake, and be potentially toxic. Windy conditions can concentrate algal blooms along water edges, increasing the risk of ingesting algae. If algal blooms are noticed, testing of water for toxins is recommended as not all algal blooms produce toxins. Cyanobacteria can produce toxins that can affect the liver and nervous system. Depending on the specific toxin and the amount ingested, animals may die suddenly, or suffer from weakness, staggering, or photosensitisation. It is important to limit access to water that has visible algal blooms until tested negative.

### 3. Nitrates

Nitrate/nitrite contamination of water can occur from a variety of sources, mostly fertiliser and manure run-offs, but drought conditions can increase water concentrations. In addition, drought stunts plant growth, causing nitrate to accumulate in plants. Immediately after it rains, plants may take up even more nitrate and become particularly dangerous. Nitrate/nitrite can cause the sudden death of ruminants. To avoid the risk of intoxication, consideration must be given to the intake of nitrate/nitrite from both feed and water. Frequent monitoring of water nitrate/nitrite concentrations is recommended and nitrate/nitrite screening tests are quick and inexpensive.

### 4. Salinity

Salinity is the sum of all mineral salts present in water, including sodium, calcium, magnesium, chloride, sulphate and carbonate. The effect on stock health and productivity depends on:

- the species, breed and age of animals;
- the animal feed (water and mineral content);
- ambient and water temperature;
- humidity; and
- which minerals are present in the water.

The measure of salinity is given as an electrical conductivity (EC) reading in microsiemens per centimetre (µS/cm). Salinity levels of 5 000 ppm TDS will result in poor performance and should not be used for pregnant cows.

### 5. Sulphates

High sulphur concentrations reduce feed and water intake, resulting in reduced growth and performance. The most common form of sulphur in water is sulphate. The sulphate upper limit depends on the size of the animal. It is recommended that water for livestock consumption contain <500 ppm sulphate (for calves), with a maximum safe level of 1000 ppm for cattle exposed to moderate dietary sulphur concentrations or high ambient temperatures. Elevated sulphate concentrations have been reported to decrease copper absorption, thus potentially exacerbating marginal or low copper intakes.

### 6. Chloride

Chloride has a number of functions in the body, including regulation of osmotic pressure and pH balance. Excess sodium chloride can result in dehydration, kidney failure, nervous system dysfunction and death. In ruminants, excessive chloride levels also increase osmotic pressure in the rumen, which causes a decrease in microbial population and metabolic activity, reducing food intake.

### 7. pH

The pH of water for stock use should be in the range 5,5 to 9,0 (Table 1). If the pH is highly acidic (less than 5,5), acidosis and reduced feed intake may occur. Highly alkaline water (over 9) may cause digestive upsets and diarrhoea, lower feed conversion efficiency and reduce the intake of water and feed.

*"The pH of water for stock use should be in the range 5,5 to 9,0."*


## CONCLUSION

It is imperative that water availability and quality remain a priority on any farming operation involving livestock. As rainfall patterns change, so water availability and quality will change and these changes need to be measured and monitored. Conduct water quality analyses whenever there are changes that could impact on the quality of the water supplied to the livestock. Water is an essential nutrient and its impact on livestock operations must never be underestimated.

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