

Water requirements for sheep and cattle

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Agriculture NSW Water Unit

WARNING: Chemical residues and pollutants

Contamination of water supplies by chemicals and other pollutants is a risk, particularly in mixed farming areas, where the use of pesticides and herbicides is common. Producers should be aware of the risks involved in the use or misuse of these compounds. Contamination of ground water or catchment areas could lead to intake of chemicals by stock and wildlife. While there may not be any direct toxic effect on the stock, some chemicals can stay in the animal as residues which may render the produce of that animal unfit for consumption and expose the owner to the cost and inconvenience of quarantine or prosecution or both.

Water is an essential nutrient for all animals. It is important for both animal welfare and business profitability that sheep and cattle have an adequate supply of good quality water. Amount and quality of water required vary between species of livestock, between classes of stock within the species, and in response to the environment in which the stock are running (see Table 2).

The suitability of water for stock use is determined by the following factors:

- water quality, which includes salinity, acidity, toxic elements and compounds, and algal growth;
- environmental factors, such as air temperature and feed quality;
- animal factors, which include breed differences and age and condition of stock.

Water quality

Quality of water is broadly defined as its fitness for consumption by livestock to maintain satisfactory production. The principal factors affecting water quality are as follows.

Salinity

The main factor which determines the suitability of water for stock is the proportion of dissolved salts in the water. Dissolved salts in water are expressed in milligrams per litre (equivalent to parts per million – ppm) or in terms of the electrical conductivity of the water, measured in decisiemens per metre (dS/m) or microsiemens per centimetre ($\mu\text{S}/\text{cm}$). Maximum advisable levels are shown in Table 1.

(1 dS/m = 1000 $\mu\text{S}/\text{cm}$ = approx. 640 mg/L or 640 ppm.)

Generally, surface waters are low in salts compared with artesian or underground water. Many factors influence the concentration of salts that animals can tolerate in their drinking water. Salinity increases the intake of water by animals, partly through the taste and partly to allow greater water turnover so that the body can regulate the salt balance.

In natural waters, the electrical conductivity (EC, in dS/m) is directly proportional to TDS (mg/L) by a factor ranging from 550 to 900, depending on the types of dissolved salts present in the water. Typical conversion factors used in Australia include 640 (Gill 1986) and 670 (Rayment & Higginson 1992). For convenience, TDS is often estimated from EC.

The following are some useful conversions:

$$1 \text{ dS/m} = 1000 \text{ uS/cm}$$

$$\text{EC (dS/m)} \times 670 = \text{TDS (mg/L)}$$

$$\text{EC (uS/cm)} \times 0.67 = \text{TDS (mg/L)}$$

Acidity or alkalinity (pH)

Water with a pH value below 6.5 (acid) or above 8.5 (alkaline) can cause digestive upsets in stock, resulting in rejection of the water, depressed appetite and consequent loss of production. If this problem is present, animals may perish, even when they apparently have adequate water.

Adding alum can correct high pH, but this should be undertaken with care as alum is highly acidic. Likewise, water with a pH below 6.5 can be treated by adding lime.

Toxic elements and compounds

Water is a potential source of important minerals and other compounds. However, the concentration of these substances can reach toxic levels, particularly in underground water.

There are a number of elements which, if present in high enough concentrations, can lower livestock productivity. These include iron, magnesium, arsenic, lead, mercury, selenium and the fluorides. Where productivity losses are suspected, the problem can be investigated by a veterinarian or livestock adviser. Such an investigation would include a detailed water analysis, combined with an examination of affected stock.

Algae growth or bloom

Algae occur naturally in both fresh and brackish waters. They respond to sunlight and fertilisers, and when environmental conditions are right, algal growth may occur that can make water unpalatable to stock.

Algal blooms are excessive growth of particular algal species. Blooms are most likely to occur when the water is still, warm and contains high nutrient levels.

All algal blooms can cause water use problems. However of most concern are those caused by blue-green algae, as a number of these are toxic.

Currently in NSW, only Coptrol Aquatic Algicide®, Cupricide Algicide® and Cupricide 110 Algicide® are approved for the control of blue-green algae and some other algae types. They must be used in

strict accordance with their label conditions and directions. These products are registered for use in farm dams, rice paddies and irrigation conveyance systems. They must not be used in rivers, streams, creeks, wetlands, lakes or billabongs, and water treated with these products must not be allowed to spill into these water bodies.

Environmental factors

Temperature

In hot weather, animals use more water for evaporative cooling. For example, shearing increases the heat load on sheep in summer because the insulation formerly provided by the fleece is lost. The sheep adjust to this heat load by increasing evaporative cooling through panting. Water consumption can increase by 78 per cent under extreme conditions. The provision of shade will largely relieve this situation. In normal conditions with good quality water, consumption in summer will be about 40 per cent higher than in winter. However, with salty water the summer intake may be 50 to 80 per cent higher than consumption in the cooler months.

The amount of water that stock drink also depends on the temperature of the water. Generally, animals prefer water at or below body temperature and avoid warmer water. Cool water is preferred in hot conditions.

Marginal quality water may become unsatisfactory during summer because animals drink more because of high temperatures and drier pasture. The salinity of some water may also increase because of evaporation from troughs, bore drains and shallow tanks.

Drought

During drought, stock require more water as they are forced to select more fibrous and less digestible feed. This extra water is used to maintain the movement of the coarse feed in the gut. As drought worsens and stock become weaker, marginal waters may become unsuitable as the animals' tolerance of the salt decreases.

Feeding salt or salt-based licks or blocks during dry periods increases water intake. If water quality is marginal, this added salt intake may depress appetite and cause digestive upsets – the opposite of the supplement's purpose.

Pasture composition

The diet of stock has a large influence on their water requirement. Good green pasture can supply all an animal's water needs. Sheep under these conditions may not need to drink for many weeks. Good pasture allows stock to use water which would normally be unsuitable at higher levels of consumption.

Table 1. Tolerances of livestock to total dissolved solids (salinity) in drinking water (mg/L)

Stock	Desirable maximum concentration for healthy growth	Maximum concentration at which good condition might be expected*	Maximum concentration that may be safe for limited periods*
Sheep	5,000	5,000–10,000	10,000–13,000
Beef cattle	4,000	4,000–5,000	5,000–10,000
Dairy cattle	2,500	2,500–4,000	4,000–7,000
Horses	4,000	4,000–6,000	6,000–7,000
Pigs	4,000	4,000–6,000	6,000–8,000
Poultry	2,000	2,000–3,000	3,000–4,000

* The level depends on the type of feed.

Adapted from Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

Table 2: Average water requirements of stock

Stock type	Consumption Per head per day (L)
Sheep Weaners	2–4
Adult dry sheep – grassland – saltbush	2–6 4–12
Ewes with lambs	4–10
Cattle Lactating cows – grassland – saltbush	40–100 70–140
Young stock	25–50
Dry stock (400 kg)	35–80
Horses	40–50

Notes: Figures quoted for consumption have a wide range; this variation is explained in the text. When planning water supply requirements, allow for evaporation losses and consumption by native and feral animals.

Stock on dry pasture need increased water consumption to utilise the less digestible fodder.

In pastoral areas, stock grazing saltbush or other chenopod plants require large quantities of relatively low-salinity water. This is because of the high level of salt in the diet and the need for a high water turnover to maintain the salt balance in the body.

Animal factors

Age and condition of stock

Young animals, heavily pregnant or lactating females, and aged or weakened stock are less tolerant of saline water. In weaner sheep, high salinity depresses growth rate and wool production, and causes scouring.

Breed differences

British breed sheep need about 20 per cent more water than do Merino sheep in hot weather.

Cattle of the *Bos indicus* or *Bos indicus*-infused breeds drink less water under hot conditions than do *Bos taurus* breeds (British or European breeds).

Watering points

The consumption of water can be affected by the cleanliness of the watering point.

Where the water level in an earth tank is low, animals may be forced to wade through mud to get to the water. Due to the boggy surroundings, the water becomes heavily contaminated with suspended soil and faeces, which can make stock reject the water. Also, animals in weak condition may become bogged and die.

Feral pigs can create the same effect by wallowing along the water's edge.

Such dams should be fenced off and the water pumped or gravitated to temporary troughing. This will ensure maximum use of the available water by avoiding fouling, and will remove the risk of stock losses from bogging.

Troughs used in watering systems should be drained and cleaned regularly. Algae grow in troughs, producing unpleasant odours in the water which can repel stock. Salinity also builds up due to evaporation if troughs are not drained.

The frequency of cleaning depends mainly on the temperature, which affects intake and the rates of evaporation and algae growth. The type of stock will also have some influence on the frequency of cleaning, as tolerance of contamination varies according to the requirements of the particular class of stock.

Contamination of trough water need only be very slight to cause problems with some stock. Instances have been recorded of weaner sheep refusing water because of a thin layer of dust on the surface of an otherwise clean trough.

Care should be taken when introducing stock to extensive paddocks or unfamiliar watering systems. When introducing stock to a new paddock, make sure they are familiar with the location of the watering point and are drinking the water, particularly in pastoral areas. If water quality is marginal or unknown, check newly introduced stock during the first week to ensure that there is no problem.

Watering radius

In pastoral areas, sheep normally graze within a radius of about 2.5 km of a watering point, and cattle within a radius of about 5 km.

If stock require more water due to lactation, salinity or dry feed, they may need to drink more than once a day. This will reduce their foraging radius and the area of the paddock being used.

Feed Quality Service

NSW DPI operates a Feed Quality Service based at Wagga Wagga which provides a quality assured analytical service with a fast turnaround time. The service is based on the latest technology and is fully accredited by NATA.

The Service also participates in all proficiency tests conducted by the Australian Fodder Industry Association (AFIA).

Packages and sampling kits

The service offers standard packages for rapid turnaround. The sampling kits are available through any NSW DPI office or by contacting the Wagga Wagga Customer Service Unit.

- Standard Forage package – \$53.30
- By-Products package – \$85.00
- Premium Silage package – \$90.00
- Grain and Mixed Feed package – \$53.30

We can also offer a tailored package for special requirements, from the following tests:

- Dry matter % (DM)
- Fat
- Dry matter digestibility % (DMD)
- Ash content
- Crude protein (CP)
- Organic matter
- Fibre
- Silage pH
- Metabolisable energy (ME)
- Silage ammonia–nitrogen

Further information

For information on custom pricing, turnaround times, collecting samples, submission and reporting procedures, contact the Customer Service Unit on (02) 6938 1957.

Acknowledgements

Greg Markwick Formerly Livestock Officer (Sheep and Beef Cattle)
Edward Joshua Development Officer Irrigation Broadacre Central NSW
Amanda Musgrave Technical officer Biosecurity NSW

References

This Primefact used the following guidelines as a reference on water quality.

National Water Quality Management Strategy Paper No. 4

Australian and New Zealand Guidelines for Fresh and Marine Water Quality Volume 1

The Guidelines (Chapters 1–7) October 2000

<http://www.environment.gov.au/system/files/resources/53cda9ea-7ec2-49d4-af29-d1dde09e96ef/files/nwqms-guidelines-4-vol1.pdf>

Replaces Agfact A0.5.4

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