

Water supply for sheep and beef cattle in stock containment areas

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Economic Development,
Jobs, Transport
and Resources

INTRODUCTION

A stock containment area consists of one or more small yards where stock are confined during periods of drought, natural disasters and other emergencies. The yards are permanent, stock proof and equipped with appropriate feeding and watering facilities, as well as shade. They are normally located on a well-drained site close to stock handling facilities but away from boundary fences, watercourses and drainage lines.

When animals are confined in containment areas they are required to live in close proximity to each other, can be exposed to increased levels of dust and mud, and are often on a more targeted diet than they might receive in the paddock.

An endless supply of good quality water is vital to maintain stock condition, minimise the risk of disease and reduce stress.

Animals placed in a containment area are totally reliant on the manager for all aspects of their welfare. Livestock managers have a legal and moral responsibility to look after their animals at all times. These responsibilities are clearly defined in:

- *Code of Accepted Farming Practice for the Welfare of Sheep (Victoria) (Revision Number 2)*
- *Code of Accepted Farming Practice for the Welfare of Cattle (Victoria) (Revision Number 1)*

QUALITY

Water supplied to a stock containment area should be of the highest possible quality available. It should be fresh, cool and clean.

The water should be low in salt, organic matter, suspended clay and free of other toxic substances such as blue-green algae, heavy metals and chemical residues.

If there is any question regarding its suitability a sample should be collected from the water source and sent to an appropriate water testing laboratory for analysis.

Evidence from recent droughts indicates stock avoid or reduce consumption of water which is:

- Warm
- Stagnant
- Polluted with food residues
- Has dust or straw floating on the surface.

Surface material should be skimmed off the water daily. Troughs should be completely emptied, cleaned and re-filled every 1 – 2 days to maximise palatability.

Recommendations for various water quality parameters are described below:

SALINITY

Salinity refers to the concentration of soluble salts in soil or water. All natural waters contain some dissolved salts such as sodium, magnesium and calcium. Sodium chloride (table salt) is the most common of all the salts; it is the main constituent of seawater. The level of salt in water affects its suitability for irrigation, stock and domestic use. Salts based on calcium and magnesium also affect the hardness and alkalinity of water.

SALINITY MEASUREMENT

There are two main methods of determining the salt content of water; Total Dissolved Solids and Electrical Conductivity.

Total Dissolved Solids (TDS) is measured by evaporating a known volume of water to dryness, then weighing the solid residue remaining. Electrical conductivity (EC) is measured by passing an electric current between two metal plates (electrodes) in the water sample and measuring how readily current flows (i.e. conducted) between the plates. EC is commonly expressed as microSiemens per centimetre ($\mu\text{S}/\text{cm}$); TDS as milligrams per litre (mg/L). Parts per million (ppm) is equivalent to mg/L but it is not a favoured unit.

The maximum recommended salt levels in livestock drinking water are shown in Table 1. Growth rates, animal condition and possible health will start to decline once salt levels exceed these limits. Livestock need to be introduced slowly to water at these upper levels of salt to minimise the impacts listed above.

Table 1 - Maximum recommended salt levels in livestock drinking water.

Stock type	EC ($\mu\text{S}/\text{cm}$)	TDS (mg/L)
Mature Sheep	9,300	5,600
Nursing Ewes	6,000	3,600
Weaner lambs	6,000	3,600
Mature cattle	6,250	3,800
Lactating cattle	5,000	3,000
Weaner calves	5,000	3,000

Adapted from: Agriculture Victoria, 2016, *Managing farm water supplies*.

OTHER IONS AND ELEMENTS

A range of other ions and elements affecting stock health and condition are listed in Table 2. While less common, these contaminants need to be considered when using a more unusual source of water or where stock health concerns are evident. Lead poisoning is a "Notifiable disease" under the *Livestock Disease Control Act (1994)* and any suspected cases should be reported to the Chief Veterinary Officer, Agriculture Victoria

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within 7 days. Any cases of suspected serious or exotic diseases should be reported immediately to the Disease Watch Hotline - 1800 675 888.

Table 2 - Livestock maximum levels for various ions and elements in stock water.

Ion or element	Rainwater (mg/L)	Upper limit (mg/L)	Effect
Calcium	40	>1000	Phosphorous deficiency, poor growth, soft bones and fractures, infertility
Magnesium	0-19	> 500	Scouring and diarrhoea
Nitrate	10 1	>1500 nitrate, >30 nitrite	Vomiting, convulsions, death
Sulphate	250	>1000-2000	Diarrhoea
Aluminium	0.05-0.2	5	Phosphorous deficiency, poor growth, soft bones and fractures, infertility
Arsenic		0.5	Diarrhoea, anaemia, poor coordination.
Copper	1	0.5	Liver damage and jaundice, copper accumulation in the liver.
Fluoride	1	>2	Tooth damage and bone lesions.
Iron	0.3	Low toxicity	Anemia, lethargy, lowered feed intake, reduced weight gain
Lead (notifiable disease)	0.015	0.1	Reduced coordination, blindness, going off feed.
Molybdenum (related to copper)		0.15	Scouring and loss of condition. Infertility, skeletal disorders, testicular damage.

Adapted from: Australian and New Zealand Environment and Conservation Council, 2000, paper, *Australian and New Zealand Guidelines for fresh and marine water quality*, Paper No. 4, Volume 3.

pH

The pH of water is a measure of how acidic or alkaline the water is on a scale of 0 to 14. Readings below 7 are acid, above 7 are alkaline. 0 is the most acid; 14 the most alkaline. Distilled water has a pH of 7 which is called neutral.

pH is a measure of the relative amount of hydrogen and hydroxide ions in a solution. pH levels above 9 and below 5 increase the availability of toxic elements such as copper and aluminium. Refer to Table 2 for more information.

TURBIDITY

Turbidity is a measure of how much light can pass through a sample of water. Turbidity is caused by solid materials being suspended in the water column. These materials include clay, silt, fine organic matter and microscopic organisms (predominately living algae). As well as having a number of physical impacts, highly turbid water is likely to have elevated levels of phosphorus; a key factor in producing algal blooms.

Turbidity is measured in NTU's (Nephelometric Turbidity Units). Clear water will have a measure of approximately 1 NTU, slightly cloudy water approximately 10 NTU, very cloudy water greater than 50 NTU. To avoid the formation of sludge in pipes and tanks, livestock managers should avoid using water with turbidity levels above 5 NTU.

LIVESTOCK WATER REQUIREMENTS

The water requirement for livestock in a containment area varies from day to day and throughout the year. In winter the water needs are much lower than in summer. A mature sheep on dry feed in summer might use 8 - 10 L/day whilst the same animal on dry feed in winter might use less than 4 L/day.

The amount of water used by animals also varies depending on their breed, type, age and weight. Female stock will have an increased demand during pregnancy and lactation. Water consumption is also affected by feed type, distances stock are walking, availability of shade and the quality and temperature of the water.

Table 3 lists the maximum water consumption for various classes of stock.

Table 3: Livestock water requirements

Stock type	Peak demand (L/head/day)	Average demand (L/head/day)	Annual demand (KL/head/year)
Dry sheep	10	6	2.2
Lactating ewes	14	10	3.7
Weaner lambs	6	4	1.5
Dry cattle	100	80	29.2
Lactating cattle	120	100	36.5
Weaner calves	70	55	20.1

Adapted from: Agriculture Victoria, 2016, booklet, *Managing farm water supplies*. Department of Economic Development, Jobs, Transport and Resources, Melbourne.

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PEAK DEMAND

Knowing the daily peak demand is essential when designing a reticulated water supply system. This information is needed to ensure the correct size of pumps, tanks, troughs and pipelines. A reticulated water supply system needs to deliver the daily peak demand in four hours. This is to ensure all stock have a chance to drink on a regular basis. As an example the minimum flow rate required in a stock containment area is 21 L/min for 500 dry sheep and 67 L/min for 160 dry cattle.

A shortage of water can result in ill thrift, disease and death as well as causing physical damage to float valves, troughs and stock.

WATER SUPPLY DESIGN

Water for a stock containment area can originate from a variety of sources including public pipelines, groundwater, rivers, streams and farm dams. When planning for a stock containment area it is important to consider quality, quantity and reliability.

The water supply system should ideally be fed by gravity and have at least four days of storage in reserve. A typical setup consists of one or more tanks located on a nearby hill or adjacent to the stock containment area. In flat country, tanks can be placed on a mound of earth to provide adequate pressure.

The pipes and fittings need to be large enough to ensure peak flow rates can be met simultaneously at all outlets within the stock containment area.

TROUGHS

Well-designed water troughs are an essential component of a stock containment area. Troughs and associated fittings need to be high quality, durable and livestock proof. Troughs need to be a sufficient size to allow all stock to drink on a regular basis. Typically a suitable trough for 500 sheep or 160 cattle would have 8 - 10 metres of accessible trough edge with a storage capacity of 400 – 600 litres.

Troughs need to be emptied and cleaned every 1 – 2 days. A long shallow trough with a smooth internal profile, gate valve and large outlet bung will make cleaning quick and efficient.

The water level in the trough must be kept close to full at all times. This requires a well-designed water supply system along with a suitable trough outlet/float valve. The float valve must be high quality, have an appropriate capacity and pressure rating and be fully protected with a durable, stock-proof cover.

Stock troughs are commonly constructed from steel, concrete and polyethylene. Concrete is the preferred material because of its durability, strength and ability to maintain water at a more constant temperature. Plumbing fittings such as taps, risers and elbows can be easily damaged by stock. These fittings need to be high quality, securely fixed to the trough or be protected with a suitable cover. The preferred option is to select a trough where all the fittings are fully enclosed within the trough design.

Troughs should be placed on a raised pad of gravel, stone or concrete to ensure good drainage and stability. They should also

be located away from feeding areas to minimise water contamination.

FURTHER INFORMATION

Drought Feeding and Management of Beef Cattle – A guide for farmers and land managers (2018)

Drought Feeding and Management of Sheep – A guide for farmers and land managers (2018)

Agriculture Victoria, 2016, booklet, *Managing farm water supplies*. Department of Economic Development, Jobs, Transport and Resources, Melbourne.

Department of Primary Industries, 2007, *Code of Accepted Farming Practice for the Welfare of Sheep (Victoria) (Revision Number 2)*

Minister for Agriculture and Resources, 1979, *Code of Accepted Farming Practice for the Welfare of Cattle (Victoria) (Revision Number 1, Prevention of Cruelty to Animals Act, 1986)*

Further information is available from local offices of the department, the Agriculture Victoria website www.agriculture.vic.gov.au or from the Customer Service Centre on 136 186

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