Coorong Tatiara

Sustainability, Agriculture & the Environment

Shandying (Blending) Livestock Water

This fact sheet covers: ● Shandying or blending ● Risks to livestock when shandying ● The aims of shandying water ● Setting up a system ● Automated shandying trial ● Shandying mains and bore water ● Shandying lake water & groundwater ● Shandying desalinated water ● Shandying water from a lined catchment ● Salinity, salinity units & salinity meters ● Water quality for livestock ● Calculating livestock water needs ● Additional resources.

Shandying or Blending

Shandying is the process of mixing clean water with drinking water to reduce concentrations of dissolved solids, soluble solids, and other minerals and salts. Clean water may be sourced from groundwater, surface water, or treated water sources. In addition, when using a technology to treat water only a portion of the water needs to be treated and then 'shandied' back with untreated water to obain the total dissolved salt (TDS) level required.

Stock do not require distilled water or rain water to be healthy so there is a potential to mix water with different qualities and sources. It just needs to be fit for purpose. (eg desalinated, bore, mains, lined catchment or rain water)

Risks To Livestock When Shandying

Shandying in tanks is possible but **care needs to be taken that adequate mixing is being achieved.** It is well known that waters of different salinity can stratify and not readily mix. Therefore options for mixing water can be added prior to pumping by using an inline static mixer which will help to ensure a homogenous result. This is also true when adding chemicals to a tank for other farm duties.

Inlet water to the tank can be piped into the body of the tank to create in-tank turbulence, but there must be adequate precaution taken to prevent siphonage or cross contamination back from the tank. Each situation must be assessed for its risk.

The Aims of Shandying Include:

- To reduce water cost.
- To minimise the use of mains water.
- To provide the best blend of water that meets your requirements, whether for livestock or other farm purposes.
- To utilise sources of water available on your property.
- To reduce the area (and cost) needed for a lined catchment.
- To reduce the size (and cost) needed for a desalination plant.

Setting Up a System

Depending on your requirements the blending system can be manual to fully automatic, or combinations. The fully automatic system generally provides better control and accuracy in blending, and have a function to shut off the system if problems arise.

Manual shandying

Manual valves are installed in the pipeline of each water source. The valves are manually adjusted accordingly until an accurate blend is achieved. A manual EC (Electrical Conductivity) meter is used to measure the salinity of the water in EC units or ppm (parts per million).

Semi-automatic shandying

Low voltage actuated valves are installed in the pipeline of each water source. A low voltage potentiometer is used to drive the actuators until the valves are adjusted and an accurate blend is achieved.

The EC / ppm measurement can be either taken with a hand held meter or a sensor can be fitted in to the blended stream which will indicate salinity on a readout. Solar power is an option.

Automatic shandying

Low voltage actuated valves are installed in the pipeline of each water source. A programed controller adjusts the valves continually to ensure the EC / ppm is always correct.

A conductivity meter is used to measure water salinity. The controller will close the saline water supply if a problem occurs. The controller can send an alarm to a mobile phone. Solar power is an option.

Reference: Water Blending - Sheep Connect SA

Automated Shandying Trial

Seed Consulting Services, supported by Atnik Solutions, installed water shandying equipment at Moonee Hills Pastoral, near Field. The site was selected because water from SA Water mains is delivered to a centrally located water tank (hilltop location) and shandied with two saline bore water sources and a groundwater access trench (wedge hole) to create a single source of water for stock watering purposes. Salinity management is an issue, as is the cost of SA Water mains supply.

The intent of the trial was to determine if automated shandying could be achieved that created time and cost *savings*.

Above:
Existing water shandying tank with three sources of water input (SA Water, smaller input pipe on the right) and two groundwater input pipes (50mm green stripe poly). The automated shandying valve is marked. A salinity probe is also marked on the final input

(blended) water source.

The trial demonstrated that automated salinity shanding is possible using simple automation equipment, software and radio telemetry and cellular networks.

There is also a time and knowledge saving benefit for use of automated shandying equipment. In particular reducing regular travel to water points to open valves manually and check salinity levels

Full details of this trial can be accessed using the following link.
https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/water-security/water-security-technology-project\

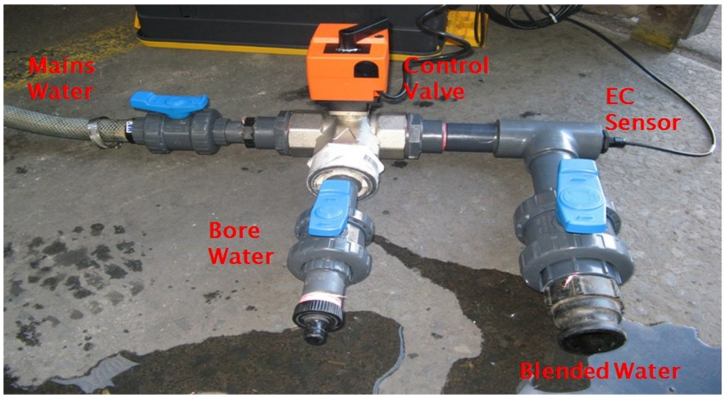
Planning to Shandy Water

The following should be considered before shandying water from different sources to ensure adequate quality & quantity.

* Understanding total farm water requirements.
* Evaluating the reliability of water sources.
* Determining the cost benefit of alternative options.
* Determining the sizes of storages (dams or tanks) needed.
* Matching stocking rates to water availability.
* Designing farm water supply and reticulation systems.
* Determining how long water supplies will last during times of prolonged dry conditions.

Shandying Mains and Bore Water

This can be set up simply with mains water and bore water, each with a flow tap & an outlet for the shandied water. Care should be taken to monitor the shandied water. This can be done with a salinity meter or there is a range of electronic monitoring equipment available. Telemetery equipment is available to monitor salinity levels remotely & to shut of the supply if necessary. It is best to send shandyed water directly to stock troughs & not store it in tanks as layering can occur.



A simple manual shandying system *Photo SheepConnect SA*

Shandying Lake Water & Groundwater

As shown above, water from the Lakes, wedge holes or bores can be shandied using simple valves and monitoring in order to achieve a reliable, cost effective and fit for purpose livestock and domestic water supply. NOTE: Groundwater access trenches (wedge holes) particularly large open ones can speed up the process of intensifying salts through evaporation & can expose groundwater to a higher risk of contamination.
Although groundwater access trenches 2.5 metres or less in depth are exempt from requiring a Water Affecting Activity permit (WAA) anything over 2.5 metres is treated as a well requiring a well construction permit using the link to application form below.
https://forms.business.gov.au/smartforms/servlet/SmartForm.html?formCode=WCP3&tmFormVersion

Water pumped from a groundwater access trench (wedge hole)

A WAA permit is required if over 2.5 metres deep.
Site must be fenced and no contamination from surface water.

Shandying Desalinated Water

Below is an example of a Saltfree Desalination unit treating 9,000 EC (5,750 ppm) bore water.
The desalinated water is then shandied with bore water and rain water from a nearby large shed to produce 3,000 to 3,500 EC shandyed water. (1,920 to 2,250 ppm)

Rainwater from a large shed, *9,000 EC (5,750 ppm)* bore water and desalinated water are blended with a simple valve system and piped throughout the property.

Benefits of shandying desalinated water

- Desalination produces high quality water suitable for use by all livestock, intensive agriculture, spraying, and domestic use.
- Stock do not need salt free water so there is a potential to shandy bore water.
- This can significantly boost the water output from the desalination plant or reduce the running costs.
- It just needs to be fit for purpose.

Shandying Water From a Lined Catchment

Below is an example of a lined catchment.
Dam holding 24 megalitres. (24,000,000 litres*)*
Catchment area 5 ha, annual rainfall 500 mm

In this system, water pumped from a lined catchment dam (rain water) into the tank below left. and the tank below right is filled with brackish bore water with salinity levels of 7,000 EC. (about 4,500 ppm. The water is blended with a simple valve system and pumped throughout the property.
The two are shandied together to provide 3,100 C to 3,900 EC (2,000 ppm to 2,500 ppm) water supply to the stock. If shandied water is used, it gives the system a greater output and could reduce the size needed (and cost) for the lined catchment.

The systems are monitored and alarmed if the salinity is not between 3,100 EC to 3,900 EC (2,000 and 2,500 ppm)
Livestock only need fit for purpose water, not necessarily rain water.

What makes the systems much more viable is the ability shandy brackish bore water which dramatically increases the output of these innovative water capture systems.

Tanks

If storage tanks are used, shandying should be undertaken before the water reaches the tank.
Inlet water to the tank can be piped into the body of the water to create in-tank turbulence.
Ideally, shandyed water should be piped directly to stock troughs and not stored in tanks.

Submersible agitators can be used if shandyed water is stored in tanks to prevent layering/stratifying & possible stock losses.

Salinity, Salinity Units & Salinity Meters

Salinity refers to the presence of soluble salts in the water. It is usually measured as electrical conductivity (EC units) which is an indicator of total dissolved salts (TDS) in the water, which is referred to as parts per million (ppm).

Be careful not to get confused with different salinity measuring units. EC units & parts per million are the most common units.

The Coorong Tatiara LAP has a **Salinity Unit Conversion Slide Chart** which is available free from the Council Offices.

Salinity Meters & Monitoring

Monitoring bore water quality is important for livestock health across the seasons.
Extreme salinity levels in unconfined aquifers contribute to rusting of metal confined bore casings.
Bore failure and high salinity levels can occur very suddenly.
Shandying, if you shandy water, an EC meter allows you to monitor the salinity level of the output water.

If you find yourself considering the questions below regularly perhaps it is time to consider purchasing your own Electrical Conductivity (EC) meter to measure the salinity of your water.

- What is the quality of the water my livestock are drinking?
- Why has there been an increase or decrease in my stock water consumption?
- How do I keep my livestock healthy?
- What is the salinity level in my bores, wedge holes, tanks and troughs?

Pocket sized meters are available which are appropriate for use around the farm, are easy to use and not expensive.

Salinity Units of Measure Convertor

Electrical Conductivity (EC units)	Parts per million (ppm) Same as milligrams per litre (mg/l or ppm)	Grains per gallon (gpg)
500	320	22
1,000	640	45
1,500	960	67
2,000	1,280	90
2,500	1,600	112
3,000	1,920	134
3,500	2,240	157
4,000	2,560	180
4,500	2,880	201
5,000	3200	224
6,000	3,840	268
7,000	4,480	313
8,000	5,120	358
9,000	5,760	403
10,000	6,400	448
15,000	9,600	671
20,000	12,800	895
30,000	19,200	1,342
40,000	26,000	1,818
50,000 *Sea water*	32,000	2,237

Water Quality for Livestock

A measure of water quality and quantity to effectively plan for livestock water supplies is critical. If water quality is poor, livestock may drink less than they need, or rarely, may stop drinking altogether. When animals drink less, they will eat less and lose condition, and if they are lactating, their milk production will reduce or cease.

Water quality for livestock in South Australia is most affected by water salinity, and the presence of water contaminants such as blue-green algae, organic material, heavy metals and chemicals. This is important to ensure that livestock can access water that will ensure that they thrive, not just survive.

Download Fact Sheet for more information:
https://www.coorong.sa.gov.au/__data/assets/pdf_file/0027/524835/Livestock-Water-Supplies-PIRSA-Fact-Sheet-1.pdf

Calculating Livestock Water Needs

The information in the link below are a guide in determining your total stock water requirements. It should be noted however that the following are average figures and variations will occur depending on weather conditions, feed available, the breed of animal, & whether they are lactating.
https://www.coorong.sa.gov.au/__data/assets/pdf_file/0024/524391/UPDATED-Calculating-Livestock-Water-Supply-Needs-Factsheet-1.pdf

Additional Resources

For a comprehensive background on water security and management in the Coorong and Tatiara please visit:

https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/water-security

Coorong Tatiara Local Action Plan

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