Department of Primary Industries
primefact

Stock water – a limited resource

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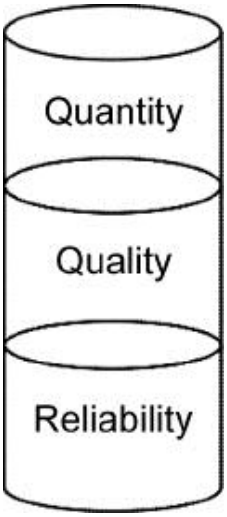
Agriculture NSW Water Unit

The best way to manage and maintain stock water is to have reliable information about your property's water supplies. This means knowing where the water is, how much is available and whether it is 'fit for purpose'. A water stocktake will provide this vital information.

The water on your farm may be derived from one of a number of sources. These may be from a river, either via your basic right as a riparian landholder, holder of a stock and domestic high security licence, from captured water in dams, or from wells or bores, with water pumped to the surface. Whatever the sources, the suitability of water you have now and the water you need for the future depend on its quantity, quality and reliability.



Water on your property is an asset to be managed and maintained.

Water stocktake: quantity

Knowing where water is on your property and how much you have available is vital in times of drought or when regulated water supplies are restricted.

Assessing your water resources involves:

- personal knowledge of your property
- detailed knowledge of your water entitlements/licences if any (riparian rights or stock and domestic licence conditions)
- continuous observation
- knowing the capacity of each water storage
- knowing the maximum (and safe) pumping rate from bores or wells
- being aware of current (and forecast/predicted) high security and stock and domestic allocations in your area

- any river/channel management conditions in your area such as pulse flows, cease to pump rules, water sharing plan rules etc.
- monitoring evaporation rates
- drawing on past experiences of water use during drought and long dry spells, e.g. which water storages are spring-fed or which have had extremely poor quality water in the last 10–15 per cent.

Your major water storages are critical in times of drought. You can always pipe water.

What size are your existing dams?

Step 1. List in a table like Table 1 (next page) all the water storages on your property that can be used for stock watering.

Step 2. Determine the width, length and depth of each water storage and fill in the calculation table accordingly.

Step 3. Using the formula relevant to the water storage shape, calculate the surface area in square metres of each water storage and enter in the table.

Step 4. Using the following formula, calculate the volume in cubic metres (m3) and enter the results in the table.

Volume (m3) = 0.4 x surface area x depth

0.4 is a conversion factor that takes into account the slope of the sides of water storages.

Step 5. Calculate the capacity of each water storage in megalitres (ML) by dividing the volume in cubic metres (m3) by 1000 and enter this in the table.

Step 6. Add up the storage capacity of all your water storages in the table to give your total existing water storage capacity.

(Extract from NSW Office of Water)

Using your water stocktake information to assess your situation

Once you have completed an on-farm water audit or stocktake, the next step is to work out the demand for the water. In other words, when do you need the water, how much is the peak demand, and what seasonal differences are likely. Next, consider where this peak water will be supplied from, whether it will come from a regulated river source, or on-farm captured or bore water. This information is essential to determine if there may be a supply issue relative to the total volume your stock need.

Table 1. Example list of water storages on the property

Water storage name or Number	Width (m)	Length (m)	Depth (m)	Surface area (m2)	Approx volume in m3	Water Storage capacity in ML
e.g. Ground tank 1	30	30	4	900	0.4 x 900 x 4	1.44
e.g. Ram paddock	100	150	4	15000	0.4 x 15 000 x 4	24.0
TOTAL						25.44

Table 2. Example list of water sources on the property

Water source	Type of supply	Total volume available (ML) (a)	Allocation (b)	Volume available for year (ML) (c) Allocation x total entitlement c = a x b	Mode of delivery	Supply restrictions
e.g. Lachlan River	Stock and domestic licence	10	15%	1.5	Irrigation Pump 8 inch	Available until spring
e.g. Riparian basic right	Stock and domestic	n/a	n/a	n/a	2 inch house pump	Reticulation scheme – only waters part of property
e.g. Bore	Stock and domestic	n/a	n/a	n/a	Submersible and tanks and troughs on-farm	Peak summer demand not able to be met due to low pumping capacity Can meet winter demands
e.g. Scheme channel	Stock and domestic licence	2	20	0.4	Scheme channel – gravity into dams	Supply only in spring this year
TOTAL		12		1.9		

If you calculate that there may be a shortfall in supply, then you should look at your system and how any modifications to your management may alleviate potential problems. E.g. saving your dam water until river supply could be tight or pumping into dams in low demand periods to ensure dams are full going into peak demand periods.

If your assessment indicates a significant water shortage, we recommend that you to look into improving on-farm water infrastructure. If your farm relies on delivery of regulated river water, seek advice from the relevant supply authorities about future supply.

Water stocktake: delivery timing

Delivery timing for regulated water is critical. If your farm relies on supply of water from regulated rivers or irrigation schemes and allocations are limited due to low levels of water in the major storage dams, the time water is delivered is a critical issue. An example may be where the river beyond a point may be run in pulses to minimise transmission losses while supplying water to users. This may affect your on-farm water supply and so should be a critical issue for consideration when undertaking your water stocktake. Similarly, your once reliable creek may have its flows changed to minimise losses to the system, and so receive only occasional flows per year. These issues will impact on the availability of water to your farm if you don't have adequate on-farm storage for this water if the time that it is available changes. Consider the consumption rates of your stock when determining if you have adequate on-farm storage.

Water stocktake: quality

Good quality water is vital for your stock, household and business. It is, therefore, important to identify and correct any water quality problems. Knowing your water quality allows you to plan for water treatments to avoid problems such as poor plant growth, blocked irrigation or stock watering pipes, staining and other undesirable effects.

Poor water quality can even render water unusable.

Problems with water quality may have a chemical basis (e.g. pH or concentrations of certain elements) or they may be due to physical causes (e.g. turbidity, where the water is cloudy with suspended solids). Some problems may be more obvious, while other problems may require more extensive analysis and treatment. Some of the common problems that affect water quality are hardness, algae and salinity.

After testing, water quality problems can be identified and corrected.

Common problems affecting water quality

- pH (best between 6.5–8.5)
- iron
- hardness
- corrosion
- salinity
- sodicity
- other elements
- turbidity/cloudiness
- algae
- colour, taste and odour
- bacterial growth.

Water quality testing

If you have any doubt about the quality of water that you use for irrigation, stock or domestic purposes you should get it tested by an accredited laboratory. It is a good idea to have your water tested before, and sometimes during use.

Water testing service

NSW Department of Primary Industries offers a water testing service for landholders to determine the suitability of their water for agricultural and domestic application (please note that water is not tested for suitability for human drinking purposes). Our water tests provide detailed information on pH, salinity, chloride, alkalinity, turbidity, hardness, saturation index and sodium absorption ratio. The water sampling kits are available at Local Land Service and NSW DPI offices.

If stock show any reluctance to drink, provide an alternative supply if possible, and consider getting your water tested.

Water stocktake: reliability – meeting the water demand

As part of assessing your property's water sources you will need to consider the average versus peak demand and how well-equipped you are to meet an unexpected interruption to normal water supplies. This means being vigilant with regard to supplies that are out of your direct control, for example river flows and allocations.

A reliable water supply is a precious resource.

Thinking about your property's water supplies as 'managing your water budget' is a good way to begin looking for efficiencies in water use across all your operations. A water budget plan may limit the severity of a forced de-stock due to insufficient water supplies.

Water requirements and maximum advisable levels of salinity and conductivity vary widely according to the type of stock and the type of grazing.

The following table indicates the water requirement of various classes of stock:

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

The following table outlines salinity concentrations in ppm (mg/L) for livestock drinking water. Note that mg/L may also be written as total dissolved salts (TDS)

Stock	Desirable maximum concentrations for healthy growth	Maximum concentrations that may be safe for limited periods**
Sheep	5000	10000 to 13000
Beef Cattle	4000	5000 to 10000
Dairy Cattle	2500	4000 to 7000
Horses	4000	6000 to 7000
Pigs	4000	6000 to 8000
Poultry	2000	3000 to 4000
** The level depends on the type of feed.		

Notes: Water consumption by sheep and cattle can increase by 80 per cent in extreme, hot conditions.

Sheep can drink 40 per cent more in summer than winter, and 50–80 per cent more if their water contains more than 2,000 ppm total dissolved salts (TDS).

Water at 4,000–10,000 ppm TDS may cause problems initially until animals adjust.

Include native animals in your calculations, although sheep drink around 6.5 times more water each day than kangaroos.

When planning water supply requirements, allow for evaporation losses. For example, the NSW Southern Tablelands has an average loss of 25 per cent of dam water over the late spring, summer, and autumn period.

Remember: your water budget is just as critical as your feed budget

Water salinity

Salinity in water is measured by its electrical conductivity, which is a measure of the concentration of the soluble salts present. The international standard for measuring salinity is decisiemens per metre (dS/m), but there are a number of other units used. These include (as well as their equivalents):

1dS/m = 1000 EC (µS/cm) (microsiemens per cm)

= 640 ppm (mg/L)

= 1 mS/cm (millsiemens per cm)

Following are the guidelines for conversion of these units:

- to convert EC (µS/cm) to dS/m, divide by 1000
- to convert ppm (mg/L) to dS/m, divide by 640
- to convert dS/m to EC, multiply by 1000

Example

A water storage on your property has the capacity to hold 1.44 ML (1,440,000 L). At assessment, the water storage is at 60 per cent capacity. How many stock could this water storage potentially service over the summer, spring and autumn period without rainfall top up?

Total water capacity = 1,440,000 L

60% capacity = 864,000 L Less 15% residual = 216,000 L

(15% of 100% capacity for fouling, bogging)

Less 25% evaporation = 216,000 L (25% of 60% capacity)

Available stock water = 432,000 L

This would supply 1000 dry sheep at 4 L/hd/day for 108 days, or 100 lactating cows and calves at

70 L/hd/day for 61 days.

For 9 months (270 days), the storage would supply water for only 400 dry sheep or 22 lactating cows with calves.

Algal (including blue green algae) identification

Concerns regarding algal growth in dams or waterways should be directed to your local Land Service. Your local Land Service can forward a specimen to the NSW DPI Specimen Lab at EMAI, Woodbridge Road, Menangle. The lab will identify the algae as positive or negative for blue- green algae only, at a cost of $26.72 ex GST for 1-10 samples or $24.26 ex GST for 11-30 samples. If the specimen is not blue-green algae, further identification will not occur, unless specifically requested.

More information

For further information about managing your resources during drought visit:
www.dpi.nsw.gov.au/drought

If you would like more information on calculating dam capacity, see:
http://www.water.nsw.gov.au/Water-licensing/Basic-water-rights/Harvesting-runoff/default.aspx

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