NSW GOVERNMENT Department of Primary Industries

primefact

Stocktaking water supply for livestock

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Introduction

For most producers, a water budget is just as critical as a feed budget during drought. 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.

Farm water may come from numerous sources including rivers, creeks (riparian areas or stock and domestic high security licence), dams, tanks, wells or bores. Whatever the source, the ability of water supply to meet demand depends on:

Water Quantity

Water Quality

Stock Demand and Water Supply Reliability

Water stocktake: quantity

Major water storages are critical during drought: water can always be piped. A comprehensive and accurate water supply inventory requires:

- detailed local knowledge
- a sound understanding of any water entitlements/licences (eg riparian rights or stock and domestic licence conditions)
- an appreciation of the factors affecting water intake by different stock and classes of stock
- ongoing observation and monitoring of stock water use, evaporation rates, seepage etc
- accurate estimates of water storage capacity
- a knowledge of the maximum (and safe) pumping rate from bores or wells
- awareness of current (and predicted) high security stock and domestic allocations
- any river/channel management conditions such as pulse flows, cease to pump rules, water sharing plans etc.
- drawing on past water use experiences during drought e.g. which water storages are spring-fed, whose quality water declines, and reductions in bore flow rates.

Estimating dam capacity

Step 1. List the storages on your property that can supply stock water (Table 1).

Step 2. Estimate the dimensions of each storage. Refer to "Dams in NSW: what size are your existing dams" to account for different shapes.

Step 3. Calculate the surface area (m^2) of each water storage in the table.

Step 4. Use the following formula to calculate the volume (m^3) and enter the results in the table.

Volume (m^3) = 0.4 x surface area x depth

Dam volume is estimated using a conversion factor of 0.4 to account for sloped sides.

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

Step 6. Add the storage capacity to estimate total existing water storage capacity.

Table 1. Example list of property water storages

Water storage	Width (m)	Length (m)	Depth (m)	Surface area (m^2)	Volume (m^3)	Water storage capacity (ML)
Ram paddock dam	30	30	4	900	0.4 x 900 x 4 = 1,440	1.44
Ground tank 1	100	150	4	15,000	0.4 x 15,000 x 4 = 24,000	24.0
TOTAL						25.44

Water stocktake: quality

Good quality water is vital to stock health and and so it is important to identify and correct any water quality problems. Poor water quality maybe due to chemical (eg pH, iron, saline, sodic, 'hard' etc), physical (eg turbidity) or biological causes (eg blue green algae). Some problems may be obvious, such as water that is corrosive or coloured, has an odour or where stock are reluctant to drink, while other problems are more subtle and may cause lower growth rates in stock that are forced to drink it.

Troughs used in watering systems should be drained and cleaned regularly, particularly in high use situations such as drought lots. They can become contaminated by dust and algae, producing undesirable odours or taste. Salinity can also build up due to evaporation.

Water quality testing

NSWDPI offers a water testing service to determine the water suitability for agricultural and domestic purposes (water is not tested for suitability for human drinking purposes). Water sampling kits are available at Local Land Service and NSWDPI offices, with more information available at www.dpi.nsw.gov.au/about-us/services/laboratory-services/water-testing

Water salinity

Water salinity is measured by its electrical conductivity (EC): a measure of the soluble salt concentration. The international standard for measuring salinity is decisiemens per metre (dS/m), but other units are used. These include (as well as their equivalents):

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

= 640 ppm (mg/L)

= 1 mS/cm (millisiemens per cm)

Use the following guidelines to convert between 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

Maximum salt concentrations for stock are affected by the intake of dietary salt and the duration of intake (Table 2). Note that animals may take time to adjust to water with 4,000–10,000 ppm total dissolve salts (TDS).

Table 2. Maximum salt concentrations (ppm or mg/L) for livestock drinking water. Note that mg/L may also be written as total dissolved salts (TDS).

Stock	Optimal maximum concentrations (ppm or mg/L)	Maximum concentrations that may be safe for short 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

*Depends on dietary salt intake

Blue green algae

Warm weather, lack of fresh flows and higher nutrient concentrations can result in algal blooms that can affect livestock health.

For identification, current distribution, hotline and other information refer to the NSWDPI website: www.dpi.nsw.gov.au/agriculture/irrigation/quality/pubs-and-info/blue-green-algae

Water stocktake: demand

Once total water supply has been estimated, and its quality confirmed, the next step is to estimate demand, including both peak and seasonal demand and possible variations.

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. Sheep and cattle adjust to this heat load by increasing evaporative cooling through panting. Water consumption can increase by 80 per cent under extreme conditions although ample shade will help offset this demand.

In normal conditions with good quality water, summer consumption will be about 40 per cent higher than in winter in sheep. However, intake may be 50 to 80 per cent higher if water contains more than 2,000ppm TDS (Table 3).

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

Stock water intake also depends on water temperature. 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 as animals drink more. Water salinity may also increase because of evaporation from troughs, bore drains and shallow tanks.

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

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

Conversely, fresh 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.

Feeding salt or salt-based licks or blocks also 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.

Include native and feral animals in demand calculations, although sheep drink around 6-7 times more water than kangaroos.

Water consumption can also be affected by watering point cleanliness. When dam water levels decline, animals may be forced to wade through mud to get to water.

Due to the boggy surroundings, the water becomes contaminated with suspended soil and manure and is unacceptable to stock. 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 troughing. This will improve water quality and availability by limiting fouling, and reduce stock losses from bogging.

Table 3. Indicative water intakes for sheep and cattle. Variation is due to water quality, overall salt intake, air temperature and breed.

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

Water stocktake: reliability

Delivery timing for water is critical, as water supplies from regulated sources can be restricted by low water levels in major storage dams. An example is a river being run in pulses to minimise transmission losses. Supplies are impacted when on-farm storage is inadequate to take advantage of high availability (Table 4).

It may be important to consider where peak water will be supplied from (eg dam, regulated river, bore) to determine if supply can meet stock demand. Anticipated supply shortfalls can then be managed, for example pumping into dams during low demand. Significant or ongoing water shortages may require additional storage, or increased supplies from regulated sources.

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

Can supply meet demand?

Example

Property water storage capacity has been estimated at 1.44 ML. At assessment, water storage is at 60 per cent capacity. How many stock could this water storage service over the summer, spring and autumn period without rain?

Total water capacity = 1,440,000 L (1.44ML)

60% capacity = 864,000L

Less 15% residual (15% of full capacity due to fouling, bogging etc) = 216,000 L

Less 25% evaporation (25% of assessed level or 864,000L)= 216,000 L

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 cows and calves.

Table 4. Example of property water sources

Water source	Type of supply	Total volume available (ML) (a)	Allocation (b)	Volume available (a x b)	Mode of delivery	Supply restrictions
Lachlan River	Stock and domestic licence	10	15%	1.5	Irrigation Pump 8 inch	Available until spring
Riparian basic right	Stock and domestic	n/a	n/a	n/a	2 inch house pump	Only supplies adjacent paddocks
Bore	Stock and domestic	n/a	n/a	n/a	Submersible and tanks and troughs on-farm	Peak demand not met due to low pumping capacity
Scheme channel	Stock and domestic licence	2	20	0.4	Channel – gravity into dams	Supply only in spring this year
TOTAL		12		1.9		

More information

Primefact 326: Water requirements for sheep and cattle

Acknowledgments

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