



SW Victoria Drought Response *Your levies at work*

Estimating Stock Water Requirements for Dairy Cattle

(Update 20/12/06)

This flier contains important information on how to calculate daily stock water requirements for dairy cattle and relate this to existing farm water storages or alternative water sources.

Estimating Stock Water Requirements & Calculating Storage Capacity of Farm Dams (Version B: Simple calculation method)

Farm water supply poses a serious challenge for a number of dairying enterprises in South West Victoria this summer and into the autumn and winter in 2007. Farms facing medium to high risk of water shortage are those that rely mainly on farm dams as the primary source of water with limited options for groundwater (bore) supplement due to limited supply or poor quality water.

Fundamental to planning water requirements for summer and autumn, is the need to estimate stock water needs on a daily basis and work out what supply is currently in storage and whether this amount will see you through the difficult season ahead.

Calculating Stock Water Needs

Dairy cattle do vary greatly in their daily stock water requirements depending on breed, stage of lactation, water quality, type of feed intake and temperature.

Daily water intake by dairy cows can be calculated as follows:

- Dry matter intake per day in kilograms x 6
- Plus 1 litre of water / litres of milk produced daily
- Plus additional allowances for extremes of weather

For example

- Assume a dry matter feed intake of 18kg, multiply by 6 = 108 litres of water
- If the cow is producing 20 litres of milk = 20 litres of water
- on a moderate temperature day in summer then no additional allowance for extremes
- Therefore, water intake could be about 128 litres / cow / day.

As a general rule of thumb, dairy cattle drink somewhere in the range of 120 – 150 litres of water per day when producing about 20 litres of milk but this figure could increase by as much as 80% on a hot 35°C+ summer day.

For example a 300 cow herd could easily consume 300 x 130 litres or 39,000 litres of water daily but this figure could rise to more than 66,000 litres on a hot summer day.

For a 150 day period (5 months) with cows averaging water consumption of 130 litres per day, you are looking at 5.85 million litres of water. If water from the same source is also required for the dairy and domestic use, then this figure will be significantly more.

Equating this to water volume in dams is quite simple if you consider that 1 cubic metre (m³) is equivalent to 1000 litres. Therefore 5.85 million litres (or 5.85 megalitres) is equivalent to 5,850 m³.

Calculating Capacity of Farm Dams

It is vital to have a good estimate of supply capacity in dams to work out what supply is currently in storage and whether this amount will see you through the season. Care is needed to make sure calculations of the cubic metre (m³) capacity at current levels are accurate.

The 'Bushy' Method for A Rough Estimate (simple but not as accurate as version A)

A: SQUARE or RECTANGULAR PONDS

1. DEPTH:

There are many options to estimate depth but by far the safest is making use of a fishing rod / reel (casting from the dam bank) with a suitable lead sinker and adjustable float. Keep adjusting float position until it actually floats and then retrieve to measure the drop between float and sinker.

2. SURFACE AREA:

- a. Measure the dimensions at current water level e.g. 60m x 80m = 4,800m² (sq m)
- b. Apply a conversion factor to take account of slope
 - For surface areas of **2,500m² – 6,000m²**, multiply by **0.6**
 - For surface areas of **1,000m² – 2,500m²** multiply by **0.45**
 - For surface areas **less than 1,000m²** multiply by **0.3**
 - e.g. 4,800m² x 0.6 = 2,880 m²

3. VOLUME:

Next multiply final figure for average surface area by estimated depth
e.g. 2,880m² x 5m depth = 14,400 cubic metres or 14.4 megalitres.

B: CIRCULAR PONDS

1. DEPTH:

Measure the depth as with a square or rectangular pond.

2. SURFACE AREA:

- a. Measure the diameter of the surface area and then divide by 2 to get the radius.
- b. Square the radius and multiply by 3.1416 to calculate surface area.
e.g. diameter measured is 50 meters then radius is 50/2 = 25m
Surface area is 25 x 25 x 3.1416 = 1,963.5m²
- c. Apply a conversion factor to take account of slope
 - For dams with a surface **radius** of **25m – 35m** multiply by **0.6**
 - For dams with a surface **radius** of **15m – 25m** multiply by **0.45**
 - For dams with a surface **radius less than 15m** multiply by **0.3**
 - e.g. 1,963.5 m² x 0.6 = 1,178.1m²

3. VOLUME:

Next multiply final figure for average surface area by estimated depth
e.g. 1,178.1m² x 5m depth = 5,890.5 cubic meters or 5.89 megalitres.

B: GULLY DAMS, RING TANKS OR TURKEY'S NEST DAMS

Calculating the volume capacity of these types of dams, is not difficult if you apply the same principles of estimating surface area and average depth to come up with an approximate figure

on current volume. For a more accurate formula to use for calculation purposes on these and dams given as example above, contact WestVic Dairy on 55922477.

Evaporation and Seepages losses

Unfortunately a significant loss of water occurs through evaporation and in some cases also seepage if a dam is not sealed well.

The amount of evaporation loss is very much influenced by surface area of the dam in relation to depth and the position of the dam in relation to wind exposure.

Shallow dams with a large surface area will invariably lose more water through evaporation than deep dams where surface area is minimized. If the top meter or so is lost to evaporation, this is from the top part of the structure which represents a large volume and can be in region of 25% + water volume loss in a single season.

In times of drought, a consideration where you have several dams on the farm is to pump water from all sources into the one larger deeper dam. This can greatly decrease evaporation losses but remember your water reticulation system must be designed for this option.

Water Quality Considerations

Drought conditions do impact on water quality especially in dams where evaporation losses are high and recent dry years have failed to fill dams due to poor rainfall and few water runoff events.

The effect is generally an increase in salt levels and monitoring water quality is extremely important for stock health and production.

The level of total dissolved salts is easy to measure and samples can be taken to local Landcare, DPI or CMA offices for testing at no cost.

Dairy cattle do not have any adverse production issues if TDS (total dissolved salts) are below 2400 ppm (mg/litre) but care needs to be taken when introducing stock to levels greater than this.

At levels above 4000ppm (mg/litre) production will most likely be affected and considerations of 'shandying' water from an alternative source (if an option) may be a better strategy to reduce the overall salt content.

If other water quality issues are of concern such as algae, iron, pH, bacterial or chemical contamination you should seek urgent veterinary advice.

REMEMBER: Planning ahead is really important - you will have more options by preparing a sound livestock water requirement plan well in advance of dams running dry.

If you're not sure about who to contact to assist with your water and livestock concerns, phone the WestVic Drought Coordinator at WestVic Dairy on 0355922477 or 0418 717552

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