12.2 Troughs

When determining the most suitable trough type, consideration may be given to the following:

12.2.1 Stock trough valves

There are a large number of stock trough valves on the market, with various levels of quality, reliability and price.

Quality and durability of valves is most often reflected in the price. At the lower end of the market, valves can be made of plastic and be of a disposable nature if failure occurs. More robust and durable valves with carefully selected materials such as pot brass and marine grade cast brass can be more reliable, with parts replaceable if needed.

Float valves are often included in the purchase of tanks and troughs. The quality of these valves and other fittings, if included in the sale, can be of low quality to maintain competitiveness with other suppliers.

When selecting float valves, the following issues should be considered:

> The consequence of float valve failure.
> The impact on the operation or the domestic situation if the water supply is interrupted.
> Will the home or stock go without water for a period of time and is this acceptable?
> What is the inconvenience caused by an unplanned failure?
> Will more time need to be spent checking a system with lower quality valves?

Water is a valuable commodity. The cost of leakages or wastage if an inferior product fails can incur additional cost in repairs. One or two failures causing loss of water and the associated cost of that water can be the difference between the initial cost of a low quality valve compared with a high quality valve.

Consideration also needs to be given to the consequence of a valve becoming blocked. It is important for valves to be easily protected from damage by stock or other external forces.

It is important to use reliable and high quality valves when tank or troughs are in remote locations, due to infrequency of checking.

Consideration should be given to how much time is spent repairing and troubleshooting valves. Demands on the landowner's time to conduct repairs, particularly at busy times of the year such as harvesting or sowing, are also important when deciding on valve quality.

12.2.2 Material

The most common construction materials used in the manufacture of troughs are concrete, recycled plastic and polyethylene. Galvanised iron and fibreglass have also been used to good effect but are now found less frequently.

12.2.3 Shape

Large circular troughs are mainly used for cattle and horses to provide adequate storage for peak demand periods. Round troughs have the advantage of being more stable. If soil or fill material is lost from around a trough, a circular trough is unlikely to tip or crack.

Rectangular troughs made in sections that sit on pedestals are prone to developing leaks or overflowing when the soil underneath erodes.

12.2.4 Weight

Concrete troughs are heavy and require a forklift or front-end loader for handling and placement. Due to their high mass, they are better insulated and experience less water temperature fluctuations.

Polyethylene troughs are lightweight and easily relocated by one person. Water in polyethylene troughs cools at night and heats up when exposed to high air temperatures and direct sunlight, which can promote algae growth. Cattle and rams will often push lighter weight troughs with their horns.

In flood-prone areas, concrete troughs provide greater stability and are preferable to the lighter weight plastic troughs unless the latter can be fastened securely. Polyethylene troughs may run dry if the water supply has been turned off or due to isolation or malfunction of a float valve. In these cases the trough could easily move or blow away in a severe wind.

12.2.5 Colour

Black poly troughs absorb more heat than those of lighter colour, which can contribute to water temperature fluctuations and algae growth.

12.2.6 Size

Sheep troughs should generally stand about 300mm high and cattle troughs about 500mm high. Although cattle can drink from sheep troughs, sheep may struggle to comfortably drink from cattle troughs. Combination troughs are available to suit sheep and cattle, standing 400mm high.

> Rectangular troughs: allow 1m of length for every 30 head of cattle or 100 head of sheep.
> Circular troughs: allow 1m of circumference for every 15 head of cattle or 65 head of sheep.

12.2.7 Size guidelines

They are based on the need to fit enough heads around the trough and avoid aggressive behaviour by dominant stock.

It is impractical to have exactly the right size trough to match varying stock numbers and stock types. However, if stock numbers are low, water in the trough may tend to foul more quickly. If there are multiple troughs in a paddock and only low stock numbers it is sensible to turn water off at one of the troughs.

If troughs are too long or too large for the number of stock they serve, the water furthest from the inlet valve may stagnate, become more easily contaminated with algae or be unpalatable to the stock. The trough must be large enough to fit a reasonable number of stock around its perimeter and hold an initial volume of water to meet peak demand. If necessary, two troughs may be needed or the water inlet located at the midpoint. Many plastic troughs include this feature.

RECTANGULAR TROUGH

Length Metres/Feet (m/')	Volume stored (litres) 300mm depth 600mm width	Sheep numbers per trough	Cattle numbers per trough
2.4m/8'	430	310	70
3.6m/12'	650	360	110
4.8m/16'	860	620	140

CIRCULAR TROUGH

Diameter Metres/Feet/Inches (m/'/")	Volume stored (litres) 300mm depth	Sheep numbers per trough	Cattle numbers per trough
1.3m/4'4"	400	260	60
1.4m/4'9"	460	290	70
2m/6'8"	940	410	90
3m/10'	2,120	610	140

The tables above represent average figures and should be used as a guide only.

12.2.8 Water volume

The volume of water stored in troughs acts as a reserve which effectively reduces the flow rate required to meet peak demands, and therefore the required pipe diameter.

Theoretically, circular troughs will collect more sunlight than rectangular models. A rectangular trough 3.6m long and 600mm wide has a perimeter of 8.4m and water surface area of 2.2m^2. A circular trough providing the same perimeter for stock to assemble would have a diameter of 2.7m and a water surface area of 5.6m^2 - at least twice the area. Larger water surface areas may cause increased algae growth.

When designing the reticulation system, consideration should be given to watering a large number of thirsty stock at one time. It is common practice in Wimmera-Mallee areas for large mobs to be placed in paddocks during summer to graze stubble. Stock may only be in each paddock for days or weeks, however peak drinking rates need to be accommodated to ensure animals are not stressed.

12.2.9 Trough placement and location

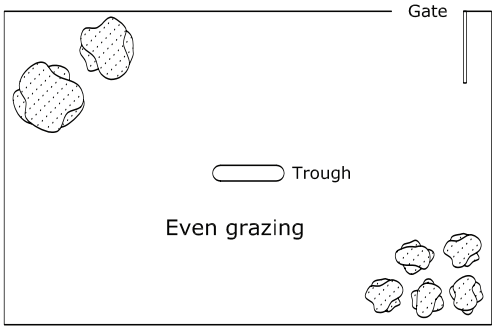
Location of troughs requires an informed decision based on the best compromise of a number of considered factors.

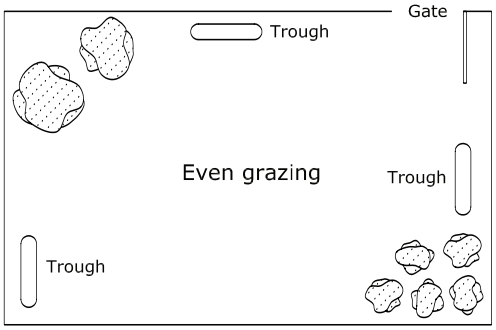
> Location of water supply and fences has a strong influence on how grazing pressure is spread across paddocks. Ideally, stock should not have to walk more than 1.5km to water as increased distances may cause uneven grazing, erosion, compaction, damage to fresh pastures and may affect stock condition. Newly-purchased stock should be driven to troughs when first introduced to a paddock because they may be accustomed to watering from dams and could fail to locate the trough.

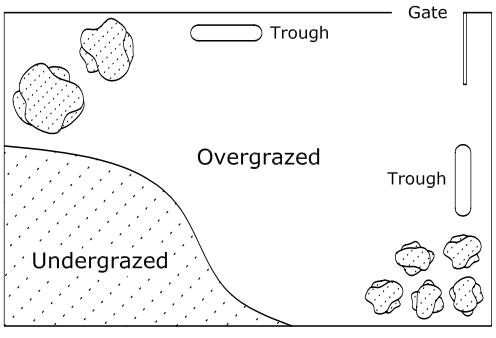
> Watering points should be located centrally in the areas they serve. Frequently it is required for one watering point to serve more than one subdivision for economic reasons. This is usually false economy because in large subdivisions, stock neglect good pastures in more distant locations and denude areas around the water point.

> Water in troughs can also be used to administer feed additives where special needs exist such as the supply of vitamins or minerals.

> From a grazing aspect the most appropriate location for troughs in a large paddock is in the middle. Central trough location ensures even grazing and minimises walking distance for stock.







> Alternatively, from a trough inspection and maintenance perspective, troughs can become obstacles for farm machinery and large broadacre machinery. Troughs in this case may be more conveniently located close to fences, or at least a machinery-width away from the fence line to enable ease of cropping.

> If troughs are located close to a fence line, the fence should be reinforced with a solid rail, barrier or sheets of welded mesh because stock may jump fences. In grazing situations, as opposed to cropping, the best location for troughs is minimum 20m away from any fence to prolong the life of the fence.

> Troughs should be kept clear of gateways to avoid obstructions during mustering and to give easy access for large machinery.

> Troughs should be located away from areas where stock are likely to camp. More dung and dust are created where stock camp, contributing to algae growth in a trough.

> It is desirable to place a trough near trees to protect stock from the elements because they are more likely to camp in this area in summer. Troughs should not be placed within trees, as sheep will then lie down around the trough. This will prevent much of the mob, especially timid animals, from accessing the water. Placing troughs on the shady side of trees or tanks can reduce algae blooms developing, but extra maintenance may be required to keep the troughs free of twigs and leaves.

> Locate troughs on the leeward side of vegetation or tree clumps to protect stock from prevailing winds and dust being dumped in troughs. This also minimises leaves and tree debris being blown into the trough.

> The most practical location for a trough is near tracks or roads for ease of access, monitoring and maintenance. If this is not possible or is undesirable, consider a large, highly-visible float attached to the float valve to allow observation of water levels from a distance.

> To prevent soil degradation troughs should not be placed in depressions, steep gully banks or areas prone to erosion. Troughs should not be located where constant stock traffic could cause lighter soils to drift. They should be placed on heavier ground that is less subject to erosion.

> The direction in which rectangular troughs are placed can affect stock behaviour. Some landowners locate troughs in an east-west orientation because lambs have been known to use the trough as a source of shade in the morning. The area is cooler due to the insulation provided by the water but problems can arise because this restricts easy access to the water by other stock.

> One long trough passing under a fence can provide water to two paddocks. The trough can be placed at right angles to the fence with the float valve and the float cover in the middle of the trough up against the fence. Although larger troughs provide a greater reserve of water they should not be too large such that they make water stagnant and unpalatable. Installation costs are lower because the trough only requires one float valve and cover and one set of risers and fittings. Maintenance is also reduced.

> It may be necessary to strengthen the fence near the trough to minimise the chance of stock jumping over if the trough is crowded. Pipe work should also be arranged so that it cannot be knocked, squashed, tugged or hooked by stock.

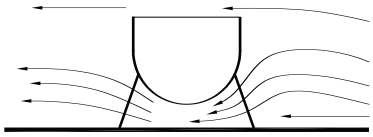
> Shade structures positioned over troughs will limit sunlight and its effect on algae growth. Shade also reduces evaporation and helps keep water in the trough cool. Too much shade and the stock may be encouraged to camp around the trough which is undesirable.

12.2.10 Contamination and cleaning

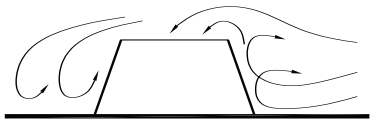
Water in troughs can become contaminated by algae, dust, dung, bees, bird droppings and dead birds. Stock troughs should be cleaned periodically to remove contaminants and deoxygenated water. If trough cleaning is time consuming other measures such as trough design, location or water maintenance may need to be considered. Stock covers are available for protection during the non-stock period.

Trough design needs to allow air to flow underneath to reduce the chance of wind-borne debris being dumped in the trough. Troughs that allow for the free flow of air both around and under are less likely to have deposits of dust, dirt or manure on the water surface when windy.

Algae is unlikely to grow in troughs fed through a reticulated system. If dung and dust contaminate the water in a trough nutrients levels will be raised, increasing the likelihood of algae. Round troughs have a larger water storage volume than rectangular troughs for a given perimeter, and can help with temperature variation and minimise algae growth.



Free air space under trough allows windbourne debris to flow through unobstructed.



Wind containing manure and soil particles can stall and deposit material in and around trough.

Troughs should have large drain bungs, with threaded bungs of at least 50mm in diameter recommended. When cleaning or changing the water in a trough, the quicker the water escapes through the drain bung hole, the more chance of contaminants escaping with the water rather than adhering to trough walls and floor.

Large drain bungs minimise idle time waiting for the trough to empty and prevent water wastage if the float valve is allowed to let more water in. The drain bung should be easily accessible and is best located on the side wall of the trough, not underneath.

A broom or other scraping device can be shaped to match the profile of troughs and can make cleaning troughs quick and easy. This can be particularly important in feedlot situations where stock are fed grain that may contaminate trough water when animals drink.

12.2.11 Bees

Bees, like many other birds and animals, need to access water in troughs. Large numbers of bees congregating at a trough at one time can be undesirable. Bees may drown in trough water if they slip in or a ripple dislodges them into the water. If bees become a problem, work out ways of giving them safe and easy access and egress to the water. Rough surfaces on troughs at the water level provides grip for the bees to safely drink or exit from the water if they fall in. A plastic container partially filled with water and covered by a rough durable material such as a stocking can be placed in the trough. This floating object provides bees something to cling to while drinking and has proven to be a successful technique.

12.2.12 Installation

Water spillage around troughs can exacerbate pugging, making stock dirty and creating slippery and possibly unhygienic conditions. Eroded areas around the trough also become muddy after rain. Troughs should ideally be positioned on a concrete apron. This may only push eroded areas from around the trough to around the apron but a benefit of the apron is the height at which stock stand to the water level in the trough remains constant. This can cause problems for smaller animals that may not be able to reach the water and ensures they have a firm and more hygienic base when drinking.

The area around each trough can be protected from erosion by placing road base material such as compacted gravel or crushed rock to a depth of 150mm. This should be maintained regularly. It is often preferable to backfill with imported gravel after stock have accessed the trough and caused a depression. Further reinforcement can be achieved by laying old car tyres around the trough and filling them with road base.

A high quality lever action ball valve or gate valve should be installed at each trough to isolate the water while cleaning and maintaining, or to turn the trough off when water is not required. Only high quality isolating valves should be installed, as frosts can lead to splitting of lesser quality valves, which will cause water wastage. Handles should be removed from valves so stock cannot accidentally shut off water supply.