



TROUGHS FOR WATERING RANGE LIVESTOCK

A water trough is the “final” component in a livestock watering system. In its simplest sense, a watering trough is merely a water container, and anything that holds water without affecting its quality can probably be used as a watering trough. However, by taking some other factors into consideration when selecting and siting a watering trough, water can be conserved, water quality can be protected or maintained, and the health of cattle can be protected or enhanced.

What should be considered in selecting or sizing a water trough?

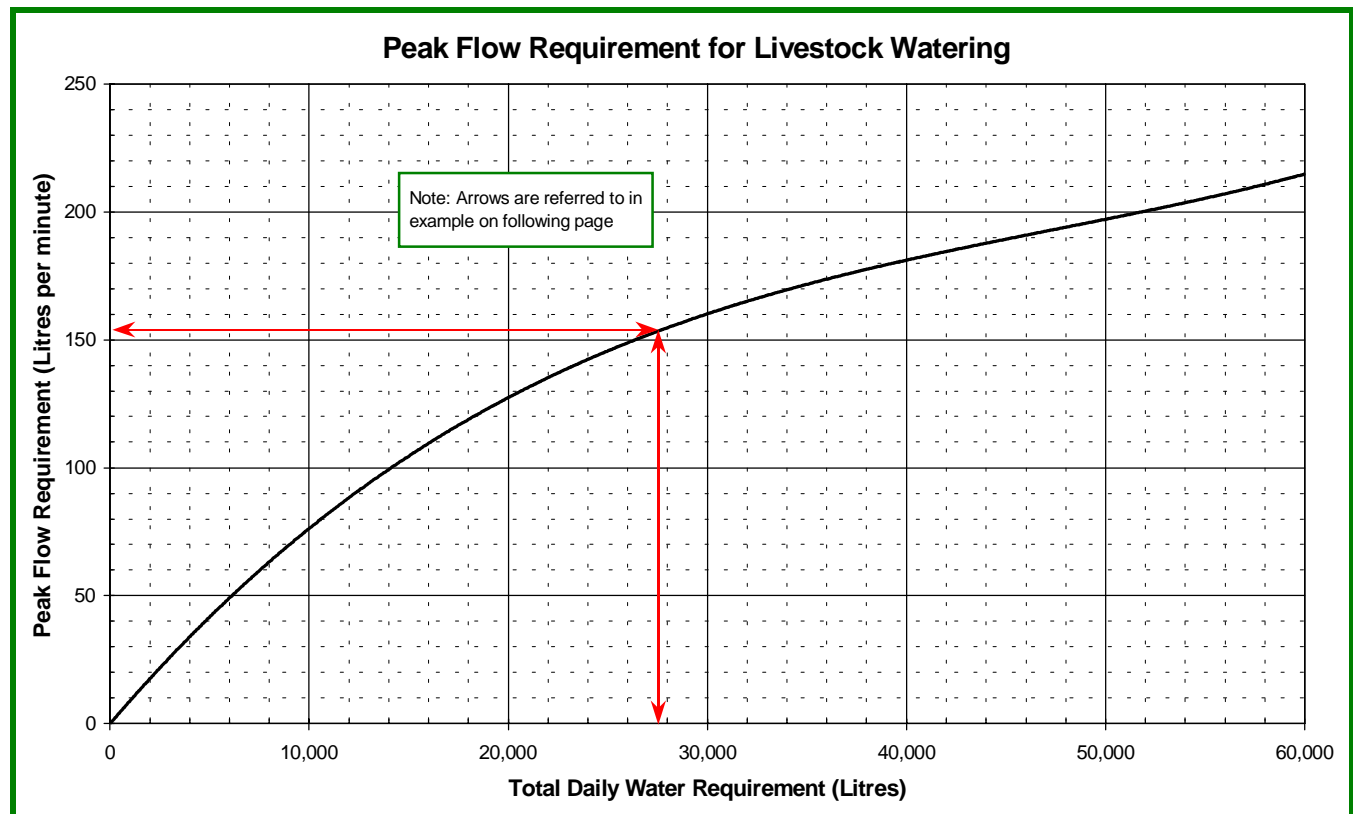
The following points are common to almost all watering troughs:

- ◆ The capacity of the trough, or series of troughs, should be suitable for the herd to be watered.
- ◆ The physical size should be suitable for the type of animal and the number to be watered at any given time.
- ◆ The construction should be sufficiently robust to take abuse from the animals, and to withstand the rigours of weather.
- ◆ The water supply should be capable of meeting peak demands.
- ◆ The trough should be easy to clean and to maintain.
- ◆ There should be some way for birds and small animals to escape if they happen to fall in.
- ◆ The trough should be easy to access in that animals should not have to travel too far to reach it, and the surrounding terrain should not inhibit movement.

Peak Demands for Livestock Watering

In a separate fact sheet (Water Requirements for Pastured Livestock), information is available that enables the total daily water requirement for various kinds of livestock to be estimated. However, this quantity of water is not consumed at a uniform rate throughout the day; it is generally consumed over a few short periods of time. Because of this, water must be supplied to a watering trough at a rate that can satisfy these peak demands, unless the trough or watering system incorporates some storage.

The following chart shows the relationship between the total estimated daily water requirement of a group of livestock and the peak demand that would be required to serve those livestock.



As an example, consider a herd of 500 cattle. The daily water requirement for a herd this size would be about 27,500 litres. While this volume of water could be supplied over a 24-hour period by a source which produces water at a rate of about 20 L/min., the preceding chart indicates that to water a herd this size without having any storage, the water troughs would have to be supplied with water at a rate of about 155 L/min.

If a water source is capable of supplying water at a rate somewhere between the minimum required 24-hour flow and the recommended peak flow rate, then storage in addition to that provided by the trough will be required. Total storage (trough and external storage) should be sized for the larger of either a two-day supply, or the volume produced by the required peak flow rate in a 6-hour period. For the example being considered, this would be the larger of either 55,000 L (2-day supply) or 57,600 L (6-hour peak flow).

For additional information on water storage facilities for livestock watering applications, refer to the fact sheet "Water Storage Facilities for Livestock Watering" in this series.

Siting a water trough

On-farm locations of water troughs may be dictated by such restrictions as proximity to a water source or the availability of an electrical supply. On the open range, the primary considerations are how far cattle have to travel to reach water, and a well-drained site that is protected from the wind, if possible. In intensive rotational grazing systems, to get optimum use of the available forage, water should be within about 400 m of the forage-producing site on level to undulating terrain; where slopes exceed 25%, watering sites should be no more than about 200 m away. For less intensively managed grazing areas, separation distances between watering sites should be between 400 and 800 m on rough terrain, between 600 and 1200 m on rolling terrain, and between 1200 and 1600 m on level terrain.

Sizing a water trough

The required size of a water trough depends on whether the trough is intended to provide storage in addition to being a drinking vessel, on the total number of livestock being served, on the rate at which the trough can be filled, and on how many animals the trough is intended to serve at any given time.

Cattle behaviour is difficult to generalize, but it seems that cattle spend a relatively small amount of their total time drinking (<1%). If a watering facility is easy to access and the water supplied to that facility can meet peak demands, then it is unlikely that any more than 10% to 15% of the herd will be watering at any given time. However, if a long walk is necessary to reach water, or if water can only be supplied to a watering site at a low rate (< 10 L/min), then the herd will likely water as a unit, and the watering site should be capable of handling the entire herd.

If cattle are to be able to drink without crowding, then each animal should have between 0.7 m and 1 m of space around the perimeter of the trough. For example, a rectangular water trough 0.7 m wide and 2.5 m long could accommodate between 6 and 8 cattle at any given time, whereas a circular water trough would have to be about 2 m in diameter to accommodate the same number of animals. Circular troughs provide the most storage for the amount of material used in their construction, but rectangular troughs provide the greatest amount of drinking space in relation to their capacity. To enable cattle to water from both sides, rectangular troughs should be at least 0.7 m wide. An appropriate height for a water trough is between 0.5 and 0.7 m.

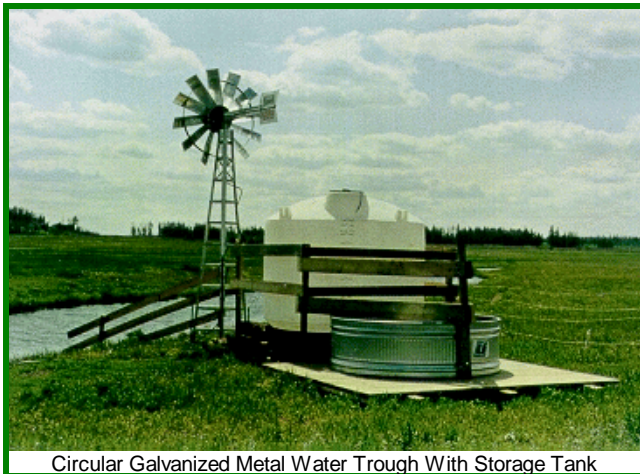
As an example, consider a case where 500 head of cattle are to be watered from a dugout on the open range. Dugouts are located so that the stock do not have to travel too far to any one source, so it is unlikely that more than 10% to 15% of the herd will be watering at any given time. The dugouts provide the necessary storage, so the water troughs do not have to provide storage. If 15% of the herd is watering at any one time, then the watering site should be capable of meeting the demands of 75 cattle at any given time. This would translate into a total daily water demand of about 4,125 L. If water is supplied to the watering site at a rate of 155 L/min (see top of page), then a group of 75 cattle could be provided with their daily water requirement in a period of about half an hour. Assuming rectangular troughs would be used, this watering site could be served by six troughs 1 m wide by 4 m long, with each trough being supplied with water at a rate of about 25 L/min.

If circular troughs are used, six 3 m diameter troughs would be sufficient. Note that if six 3 m diameter troughs with a depth of 0.7 m are used, the troughs themselves would store about 30,000 L of water.

Refer to figures on the last page of this fact sheet for assistance in determining volumes and drinking space for circular and rectangular troughs.

Materials for construction of a water trough

As stated previously, water troughs can be constructed of any material as long as they hold water, and as long as water quality is not affected. Standard galvanized metal water troughs are available, as are circular corrugated metal tanks. Other materials commonly used for constructing water troughs are wood, polyethylene, fibreglass, concrete and steel. When using wood, ensure that any preservative treatments applied to the wood are non-toxic. Salvaged materials such as steel tanks, steel barrels and even old truck and tractor tires (as long as they are provided with a water-tight floor) are commonly used. However, containers that once held toxic compounds such as pesticides, cleaning products, crude oil or any petroleum products should not be used under any circumstances. In almost every case, the cost of *properly* cleaning and coating such materials for re-use as a water trough would be prohibitively expensive. As a rule-of-thumb, anything that once held food or food-related products can safely be used as a water trough.



Circular Galvanized Metal Water Trough With Storage Tank



Tractor Tire Used as a Water Trough

Other Factors to Consider When Building and Placing a Water Trough

Any plumbing or valves within the water trough should be protected from being damaged by cattle using the trough. Troughs large enough to permit animals to actually enter the trough should be fenced to prevent such activity from occurring. Light-weight water troughs (galvanized metal, fibreglass, polyethylene) should be securely anchored to prevent movement by animals. As a minimum, the site of a watering trough should be well-drained so that it does not become muddy or have standing water around the trough. For permanent installations, provision of a “hardened” surface (concrete pad, gravel, wooden decking) around the trough may be beneficial.

Water Trough Maintenance

At the beginning of every season, the trough should be cleaned and the plumbing system which supplies the trough with water (and drains the trough, if applicable) should be checked to ensure all components are in good operating condition. Inlet screens and float valves in particular should be checked to ensure proper operation and maintenance of the desired level. Site drainage should be checked and any necessary modifications made to ensure adequate drainage. Any fencing material should be checked to ensure its integrity.

During the operating season, the site should be periodically (every two or three days) checked to ensure that there are no leaks and that the plumbing system is operating as it should. The water trough should also be checked for general cleanliness and the presence of undesirable matter such as leaves and dead animals or birds. At the end of the season, the watering trough should be winterized by draining the trough and the piping supplying the trough, opening all valves, and removing components like screens and floats.

The Bigger Picture

Watering troughs are only one part of a livestock watering system that can protect source water quality and provide enhanced livestock health and productivity. For additional information on watering troughs or components comprising them, as well as additional information on total livestock water systems, contact your local PFRA office.

Sources of information for this Fact Sheet included: WATER FOR ANIMALS, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, Rome, 1986, <http://www.fao.org/docrep/R7488E/r7488e00.htm#Contents>; BC Livestock Watering Manual, BC Ministry of Agriculture and Fisheries - Soils and Engineering Branch, 1990; BC Ministry of Agriculture and Food - Livestock Watering Factsheet No. 590.300-12 - GEF Livestock Water Trough.

UNIT CONVERSIONS

1 US gallon = 3.785 litres
1 Imp. Gallon = 4.546 litres

1 cubic metre (m³) = 1,000 litres
1 kilometre = 1,000 m = 0.62 miles

1 metre (m) = 3.28 feet
PI (π) = 3.14159

USEFUL FORMULAE

Circular Trough
Volume (litres) = $250 \pi D^2 h$
Perimeter (m) = πD

Rectangular Trough
Volume (Litres) = 1,000 LWh
Perimeter (m) = $2(L+W)$

where D, L, W and h are measured in metres

