

Remote Winter Watering Systems for Beef Cattle

Remote winter watering systems allow producers to provide water to cattle during the winter beyond the traditional confinement yard site without expending large amounts of money running electrical lines to remote locations. On the following pages, four new innovative ways to provide water to the herd during the cold of a Manitoba winter are discussed.

Why should you use a remote winter watering system?

Providing water to cattle in remote locations allows producers to lower costs and improve field fertility by using the practice of "out-wintering." Out-wintering is defined as: *"Managing a field area where cattle are fed so that manure does not need to be hauled while perennial crops are not smothered by nutrients or fibre."*

Out-wintering with a remote watering system offers many advantages over traditional confined feed yard situations such as:

1. Clean and abundant water in all weather.
2. Widespread manure distribution ends manure spreading costs.
3. Manure nutrients are spread on pastures or hay fields.
4. No fouling of dugouts and watercourses.
5. Reduced electricity use.
6. No need to run electrical lines to remote locations.
7. Ability to choose setback distances from riparian areas or property lines.

A recent study by the Western Beef Development Centre and the University of Saskatchewan indicated that cows eating processed bales



on pasture fields during the winter pasture can boost pasture forage yield the following growing season by 269 per cent.

Remote winter watering considerations

1. Water needs to be moved to an above-ground location where the animals can drink.
2. Once water is in a freezing zone, it needs to be protected from turning to ice.

Technological advances in the use of natural energy sources such as geothermal heat and solar and wind power allow producers to address these issues.

Motion Detector Water Pump-up System



Concept: Cattle drink from a small bowl which only fills with water when a motion sensor detects movement in front of the drinking bowl.

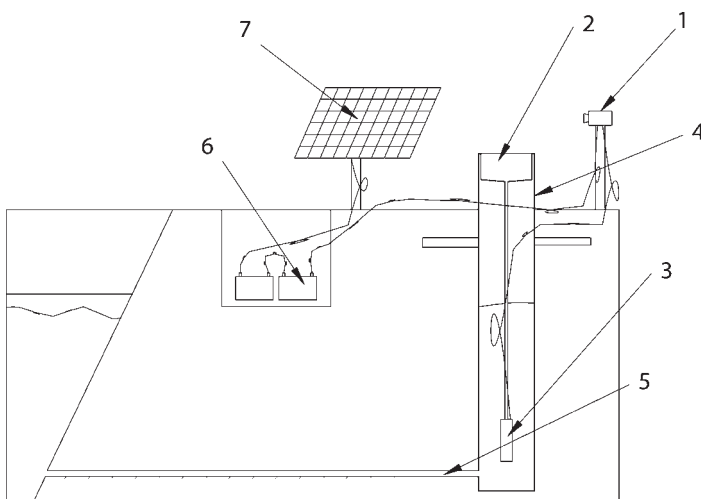
Process: When an animal walks up to the drinking bowl, an electronic motion detector turns on a pump that fills the drinking bowl with water. When the animal leaves the detection area, the pump shuts off and the water drains back down through the pump so no water is left exposed to the cold. A filter

prevents hay and debris from going back down into the pump with the water. The pump is powered by a solar DC battery.

Limitations: Water supply needs to be within 15 feet (five metres) of the soil surface. If water can be sourced from a high water table or from a nearby dugout, this system can be very effective. However, if water needs to be pumped into the water column first and then re-pumped to the drinking bowl, this system will require two pumps and at least twice as much DC power supply to provide water.

Manitoba experience: These pump-up systems work very well and do not freeze if kept in good condition. If the filter is not cleaned often enough, it will clog and water will not drain back from the drinking bowl and will freeze the bowl and supply line. The DC storage batteries that run the pump must be protected from the bitter cold. Warm batteries charge easily and give more power when needed. A discarded household chest freezer makes an excellent battery storage compartment and will protect the batteries when buried in the ground and covered with straw and/or snow.

Motion Detector Water Pump Up System



Major Components

1. electronic motion detector
2. drainback drinking bowl
3. DC submersible pump
4. galvanized culvert
5. water supply line (gravity feed)
6. battery storage
7. solar panel, voltage controller

Portable Ice-free Waterer

Concept: Cattle drink from a water trough which only has a small area situated outside of a well-insulated building. The building temperature is moderated by the latent heat of the hundreds of gallons of water stored within the building.

Process: A small, highly-insulated, portable building encloses a poly tank that holds hundreds of gallons of water, several degrees above freezing. Because of the good insulation, the warmth from the water is retained and the building temperature is held above the freezing point. This system works best if most, if not all, of the water in the tank is exchanged daily. If all of the water is not consumed and exchanged with new water, it will cool and the system will begin to freeze, starting with the drinking area.

Limitations: This system works very well when the building is well insulated as the overnight temperature dip will not effect the indoor temperature significantly. This system should have enough cattle drinking so that at least 300 gallons (1,300 litres) of water are consumed and replaced daily. Fresh water each day will overcome the cooling effect from the drinking holes and building temperature losses.

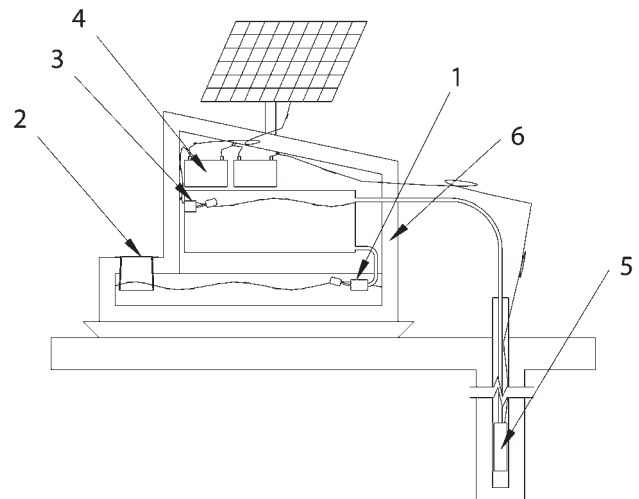


Manitoba experience: These portable ice-free waterers work well in Manitoba winters. Some ice may need to be cleared from the drinking tubes on the coldest days, but generally no other maintenance is needed. The best part of this system is that the interior of the building stays above freezing, and batteries, and/or gasoline powered generators located within the building work as if it were summertime. In addition, this small building can be hoisted onto a bale mover and hauled to other well locations as required.

Major Components

1. drop pipe, float valve and float
2. drinking tube
3. DC electric float switch
4. batteries
5. submersible well pump
6. 6" insulated walls/ceiling

Portable Ice Free Waterer



Mining Tire Geothermal Waterer



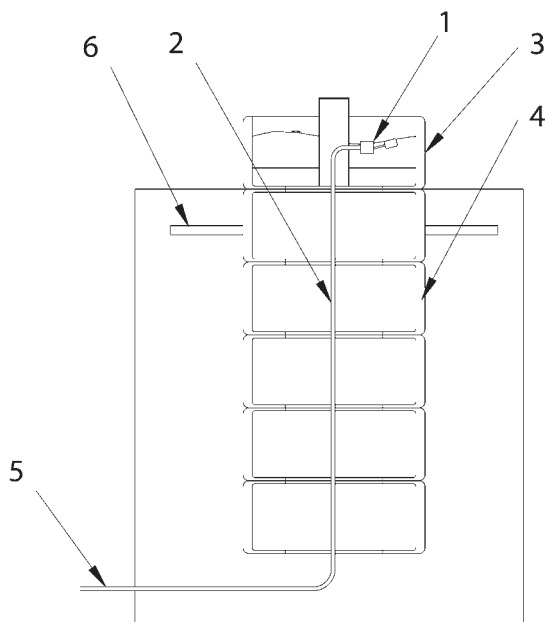
Concept: Cattle drink from a water trough made from a used industrial mining tire. The bottom side of the drinking water trough is kept relatively warm with geothermal heat rising from below the frost line.

Process: Water is provided through a buried supply line from an existing water system. The tire pit below the ground level allows for geothermal heat to rise which helps to keep the supply line thawed and the bottom of the drinking trough warm. This process works best with very thick rubber tire faces. As rubber thickness increases, the R-insulating value of the trough also increases. In cold weather, the float will freeze into a layer of ice which will need to be cleared daily. But if this system is built properly, the geothermal warmth will keep the supply line below the trough free of ice during the coldest weather. Where the supply line passes up through the frost line in the soil is the most likely place the system will freeze.

Limitations: The mining tire trough will generally have a layer of ice each morning which will need to be cleared. But once the ice is cleared, the cattle drinking will keep the trough free of ice for the remainder of the day. There must be enough cattle drinking from the trough to completely replace all the water every day, otherwise the water will get colder and eventually freeze solid.

Manitoba experience: Many of these units are in used Manitoba today. Generally, the supply lines don't freeze and the only maintenance needed is to clear the drinking area and float valve of ice on cold days. This system is not suitable for small herds which only drink part of the trough capacity each day. This system is well suited for deep-burial pipelines that travel great distances underground - too far to carry electricity lines for heaters.

Mining Tire Geothermal Waterer



Major Components

1. float valve and float
2. riser pipe
3. mining tire trough
4. mining tires
5. supply line 40 psi
6. frost limiting Styrofoam

Geothermal Ice-free Waterer

Concept: Cattle drink water out of the top of an insulated galvanized tube which contains about 500 gallons (2,300 litres) of water. The water is kept warm from geothermal heat and the latent heat contained within the water itself.

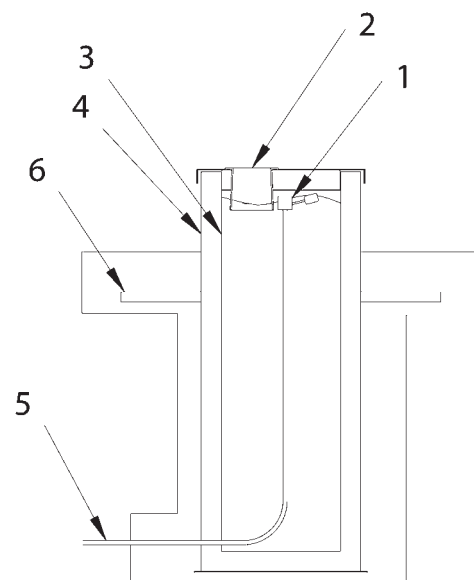
Process: Cattle drink directly out of a drinking tube located at the top of the four-foot (1.2-metre) diameter insulated galvanized culvert. The culvert is 10-feet (3-metres) tall with eight feet (2.4-metres) below ground level. The latent warmth of the water keeps the small diameter drinking tube free of ice even in cold weather. The water supply pipe enters the bottom of the culvert below the frost line, and comes up the middle of the culvert to be controlled with a float valve under an insulated lid. Water height is set by a float valve which needs to be within three to five inches (7.6 to 12.7 centimetres) of the top of the culvert so that cattle can easily reach the water.

Limitations: The geothermal ice-free waterer is a new innovation but has proven itself on several farms in the Interlake region of the province. The largest limitation is that under exceptionally cold weather, the drinking tube may develop an ice plug in the drinking hole which needs to be cleared. This situation may occur a few days each winter.



Manitoba experience: These units work well with minimal management and are ideal for long-run underground water supply pipelines. In some situations, deep pipelines have been installed running over one mile (1.61 kilometres) from the water supply. The major advantage of these units is that once they are set up, there is nearly no cost of upkeep and no electricity bills or heaters required to keep the water clear of ice. These units can also be adapted to DC-powered deep well pumps and drilled well situations with little modification.

Geothermal Ice Free Waterer



Major Components

1. float valve and float
2. drinking tube
3. polyurathane spray on insulation
4. galvanized culvert
5. supply line 40 PSI
6. frost-limiting Styrofoam

Tips for remote winter watering

- Take advantage of geothermal energy. Using large amounts of water or warm soil as an energy source can save you money.
- Always use a deep burial pipeline running from an existing pressure system if the remote watering area is within three-quarters of a mile (1.2 kilometres) of the water source. A centralized electric pump is always a better choice than a remote pump, water source and energy system.
- With exposed water systems, the larger the open water area, the more difficult it becomes to keep the area ice-free. With some animal training, a small roof with canvas drapes around the open water area can reduce ice problems with little cost.
- If you use DC storage batteries with solar or wind generation, you must protect the batteries from the cold. Burying the batteries in the ground is the most effective way to keep batteries in a reasonable environment.
- With DC electric pumping systems, a voltage regulator and low voltage disconnect will save the batteries from overcharging, and excessive discharge. A voltage meter is optional but helps to monitor battery condition.
- When installing any geothermal soil warmth system, a layer of Styrofoam, 12 inches (30 centimetres) below the soil surface, will keep frost from penetrating deep down.

When building a remote watering system that relies on natural energy sources, take extra care in construction and insulating. Use quality valves, electrical equipment and pumping devices to avoid problems, as fixing deficiencies at the coldest point in a Manitoba winter may be difficult or impossible. Remember, the worst problems will happen at the coldest temperature!

**For more information on livestock winter watering systems,
contact your local Manitoba Agriculture, Food and Rural Initiatives office
or visit us online at manitoba.ca/agriculture/production**

The following agencies worked collaboratively and provided funding support for this publication:

- **Manitoba Agriculture, Food and Rural Initiatives**
- **Agriculture and Agri-Food Canada**
- **Manitoba Forage Council**

Partial funding for this publication was provided by the Greencover Canada Program, a five-year, \$110-million Government of Canada initiative to help producers improve grassland-management practices, protect water quality, reduce greenhouse gas emissions, and enhance biodiversity.

For more information please visit <http://www.agr.gc.ca/env/greencover-verdir> or phone 1 866 844-5620.