

Water vs. Snow – Facts, Science & Management

The reasons we use extended winter grazing programs are numerous and range from economics, soil health, manure management, water quality management and forage yield increase, among others. One of the challenges faced by producers is how to water animals in these systems. The use of remote winter watering systems solves this issue, but what if there isn't a water source on the field we'll be using to swath-graze, or in the hayfield we plan on bale grazing? Is having your cows rely on snow as a water source a viable option? First, let's look at some facts about winter watering.



Facts

- * Bred heifers and dry cows require between 20 and 33L for water per day. In the winter a good average to use is 20L/cow/d and lactating animals require 50% more water than dry cows.
- * Cattle get water from 3 sources – liquid water provides the most, they also get water from their feed, and finally, a small amount from metabolic processes.
- * Watering on dugouts and cutting holes in ice for animals to water is risky – to both people and animals.
- * Cattle snow-grazing consume snow all day, rather in 1-2 visits to a trough.
- * Snow-grazing is a learned behaviour, and typically has an adjustment period of 1-3 days.

Science

There have been a number of studies conducted comparing snow as a water source, and many of them have been done in Alberta. Here is a summary of the results of this work: (sources: Young, Tennessen & Degen 1980; Young, Degen & Tennessen 1980; Degen & Young 1984; Degen & Young 1990)

- * Heat of digestion melt snow and warms it to body temperature.
- * Feed intake of animals using snow as a water source does not change in most circumstances.
- * The form of water does affect energy requirements. Since snow is consumed slowly and all day, the rumen temperature is minimally affected, however when cattle water from troughs, they consume all their water for the day in 1-2 visits, where the large volume of cold water can drop the rumen temperature quickly.
- * If water is limited, cattle will consume snow to compensate, and cattle with access to water will still snow-graze.
- * Studies have shown no change in feed intake & rate of gain or in milk output of lactating cows.
- * Cows consume 14-20kg of snow/day to meet water requirements (Degen & Young, 1990)
- * It takes 10cm of snow to get 1cm of water.

Management

What may be more important than the science, is how snow-grazing is managed. On the second page of this issue we talk about how no winter watering system is maintenance-free, and the same applies to snow-grazing. Proper management is the key to making all winter watering systems successful. Many of these management suggestions are applicable to any wintering system.

- * Snow must be clean and soft in order to be used as a water source - cattle must be able to lick large quantities into their mouths. Trampled, crusted or snow with lots of ice crystals make it difficult for cattle to consume enough to meet their requirements.
- * Monitor herd for water intake; decreased feed intake usually follows inadequate water consumption. This leads to loss of condition.
- * Cows should be in good body condition (BCS>3) if they are to snow-graze as their only water source.
- * Snow-grazing is a learned behaviour. By including cows who have experience snow-grazing, new animals will learn quicker. The transition period can still be 1-3 days.
- * An alternative water source must be available – conditions may change to where animals can't meet water requirements.
- * Ensure that cattle have a balanced ration, so they are meet all of their protein, energy and mineral requirements too.
- * Provide shelter and bedding (windbreaks allow cattle to get out of harsh winds).

There are a number of things to consider when it comes to providing water to livestock in the winter, but it is essential that a reliable water source is available. In the next pages we'll see more options for winter water.



Winter Water—

Canadian farmers are an innovative bunch and some of the watering systems being used as an alternative to heated water bowls can definitely be categorized as innovative.

Nowadays there are several commercial options when it comes to winter watering systems, the important thing to remember is that none are maintenance free. Any kind of system that depends on water remaining liquid in a climate that has the potential to be -30°C or colder on a regular basis will require maintenance. The amount of maintenance can vary though, depending on the type of system that is used.

Geothermal Watering Systems

The key to designing a winter watering system is to prevent freezing. This can be done by supplying heat, reducing heat loss from the water, or to drain the water below the frost line when animals aren't watering. Geothermal heat is a popular choice for use in winter watering systems. This concept is utilized by the majority of the commercial watering systems available. The main differences in these systems comes from the above-ground component, ie. how the water is delivered to livestock.

The basics of a geothermal watering system involve a water source of course, and a water supply line within an insulated tube. The supply line enters the insulated tube below the frost line, and depending on the system, water either remains in the line at all times, or is allowed to drain back below the frost line when the waterer is not in use. Another standard feature of these systems is a layer of frost limiting Styrofoam or an insulated pad around the waterer that helps to prevent cattle from punching out the ground around the waterer and also prevents frost around the system. The insulated tube, whether it's a culvert or even industrial tires, contains the geothermal warmth, and keeps the supply line from freezing

As previously mentioned, the primary difference in these systems is how livestock access the water, the options vary from continuous access, to animal operated or motion activated. In the following sections we'll go through some of these geothermal or wet-well based systems as well as some other systems.

Ice-Free Geothermal Waterers

This is a good example of how geothermal heat can be used to keep water available to livestock, even in the coldest winter. With this system, cattle have direct access to water through a drinking tube. The tube has a small diameter and therefore, the heat of the water can keep it ice-free. The water level is regulated with a float and valve, and the float level must be adjusted to that cattle can reach the water. These systems do have the potential of developing an ice-plug in extremely cold weather, in which case the plug would need to be cleared.

Tire Geothermal Waterers

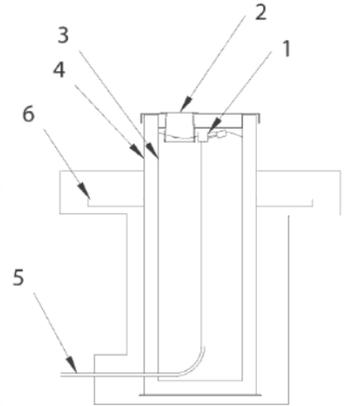
These systems are typically built from used industrial mining tires. With this system, a stack of tires is buried in the ground and around the water supply-line. The best tires to use still have a very thick layer of rubber, as the thicker the rubber, the higher the insulating value of the tire. The tires contain the geothermal heat, which keeps the supply line thawed, and also heats the bottom of the trough-tire and keeps the water on the surface liquid for livestock. This system operates with a pump-triggered float, which is also a draw-back for this system, as the float can often freeze in the thin layer of ice overnight. This system needs to be checked daily to make sure the float hasn't frozen.



Motion Controlled Water Bowls

This type of system is quite versatile and can be run off either a dugout, where the water is gravity fed, or off a well or pressurized line. These systems require power to run the motion eye and the pump, and this power can be supplied by tying into the power grid or by using solar panels to recharge deep-cycle batteries. These systems utilize a wet well, where the waterline is below the frostline. Livestock simply walk up to the water bowl, where the motion eye detects them, and triggers the pump, which pumps water from the wet well up into the waterbowl. After the animals have left, the water drains out of the waterbowl, back down into the wet well. This type of system doesn't leave any water in the bowl to freeze, and there is no learning curve for the cattle. Access should be limited so that the eye will see livestock as they approach specifically for water, this can be done easily by having the bowl only accessible from one side.

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



Basic design of a geothermal watering system
(Remote Winter Watering Systems for Beef Cattle—MAFR)



(Remote Winter Watering Systems for Beef Cattle—MAFR)

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Solutions for Your Farm

By: Stacy Pritchard

Thermosink

The Thermosink system uses gravity and water pressure to provide water to livestock with no electricity required. The design of the system is pretty simple, 2 heavy polyethylene pipes are buried vertically side-by-side. One is topped with a float, and the other with a removeable water bowl. Water enters through a pressurized inlet into the Thermosink, where it fills the main tank, which has an adjustable float. There is a crossover pipe between the 2 tanks that allows the water in the first tank to fill the second tank as animals drink out of it. The tanks are made of polyethylene, which means there are no parts to worry about rusting. Water heated by geothermal heat rises to the surface, and cooler water settles to the bottom where it is heated and the water continues to circulate enough to keep the surface water from freezing. The Thermosink is available with either a single water bowl or with a double waterer.



(<http://www.env.gov.bc.ca/wat/wq/nps/>)



(frostfreenosepumps.com)

Frostfree Nosepumps

The Frostfree Nosepump was developed by Jim Anderson of Rimbey, AB. They also operate off a wet well, but require no power source, as livestock pump their own water up. The Frostfree Nosepump (FFNP) is suitable for use by cattle, horses and bison. Animals need to be taught to use the FFNP, this should be done with a small group (15 head) first where the FFNP is the only water source. Starting in warmer temperatures, where the pendulum is set to the back, so cattle don't have to push as hard to get water as they are learning. Pump water a couple times a day so cattle can learn where the water is coming from. Cattle will learn quickly how to use the FFNP, and once the initial group has learned, the rest of the herd can be introduced gradually, and the new cattle will learn from the initial group.

Insulated Troughs

These systems can either be filled from below, with a pipe buried below the frost line, or from above, using a pump with a pipe that drains to the source. These troughs are designed with a thick layer of insulation to prevent the trough from freezing solid. An important thing to note when using insulated water troughs, is to select the size that is most appropriate, as having a trough that is too big can result in limited water movement and freezing. Having a trough that is empty and has to refill is better than one that stays full and freezes.

Home-Built Systems

There are also a variety of innovative home-built systems that have been working for producers for years. Year after year, tweaks and changes are implemented based on trial and error, learning from the previous year. Every year, PCBFA organizes a Winter Watering Systems Tour where we see how innovative local producers are watering their cattle during the winter. This year, we will be in Silver Valley on January 31, 2015. This is a great opportunity to see what your neighbours are doing, to brainstorm and troubleshoot your own systems, and network with producers facing the same challenges.

There are a number of resources available for more information on winter watering:

frostfreenosepumps.com

thermosink.com

kellsolar.com

Water Requirements for Livestock—Alberta Agri-Facts
Remote Winter Watering Systems for Beef Cattle—MAFRI

Keys to Keeping Your Batteries Charged

Remote watering systems are often off-grid and so the use of solar energy is a great option. The majority of solar systems use solar panels to charge batteries which run the pumps in whichever system is being used. Here are some tips for ensuring that your batteries are staying charged:

- * Discarded chest freezers make excellent storage compartments for batteries. These will protect batteries from the elements and warm batteries charge better, so keeping them insulated against the weather is important.
- * Solar panels can keep your battery charged, but aren't efficient for charging to start with.
- * Solar panel angle
 - * *Minimum angle of 15°*
 - * This prevents build-up of dust and dirt, and the rain can wash the surface of the panel.
 - * *Ideal Angle = Latitude + 15°*
(latitude in Fairview is 56°)
- * Don't forget to clear the snow off the panel!
- * Select the right battery, or use several batteries to meet the needs of your system,
- * Deep cycle (marine or leisure) batteries are suggested.
- * Consider providing a back-up power source like a wind generator, for stretches without much sunlight.



Contact us for:

- Project Ideas
- Feed Testing
- Environmental Farm Plans
- Growing Forward 2 Assistance
- Ration Formulation Help
- Past Project Information

Upcoming Events!

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Cow-Calfenomics

- * Jan 20, 2015
- * Grande Prairie-Holiday Inn Hotel & Suites
- * 8:30am-3pm
- * Cost: \$25
- * Opportunities & Challenges to Expanding the Cow Herd * Transition Tactics * Cost of Bred Heifers * Managing Prosperity * Innovative Business Models * and more!
- * Register by Jan 14, 2015 by calling the Ag-Info Centre 1-800-387-6030

Peace Agronomy Update

- * Jan 15, 2015
- * Dunvegan Motor Inn, Fairview
- * Topics to be covered include:
 - * Crop Nutrition, Soybean Production, Wheat Midge & Cutworms, and a Market Update

Managing Information of Profitable Cow/Calf Production

- * Feb 10, 2015
- * Days Inn, High Prairie
- * 9:30am-3:30pm
- * Cost: \$25
- * BIXS 2.0 * Herd Management Options * Genetic Selection Tools * Animal Health & Welfare * Nutrition * Profiting for Information Management & Genomics
- * Register by Feb 6, 2015 by calling the Ag-Info Centre 1-800-387-6030

Alberta Crops Extension Meeting

- * Feb 12, 2015
- * Spirit River
- * 9:30am Registration
- * Topics to be covered include:
 - * Crop Pest Update & 2015 Forecast * Market Update & Outlook * Local Producer Panel

Winter Watering Systems Tour

- * Warm Bus Tour & Learning Day
- * Jan 31, 2015
- * Silver Valley
 - * 9:30am Coffee & Registration at Savanna School
- * See innovative ways other producers in the area are using!
- * Helpful Tips to Help you Succeed



AGM

- * Feb 20, 2015
- * Fairview
- * 5pm registration
- * 5:30pm Meeting
- * 6pm Supper
- * 8pm Entertainment
- * \$55/person or \$75/farm pair
Includes 2015 Annual Membership!

Agricultural Tour of Scotland

- Foothills Forage & Grazing Association*
- * July 16th—July 3rd, 2015
- * See a variety of operations - from sheep to beef, dairy and even reindeer!
- * Castles, Sheepdog Demo, Highland Games, Distillery Tour & the Royal Highland Show
- * Contact Cassie with questions: 403-652-4900 or cassie@foothillsforage.com
- * Registration by Jan 15, 2015

For more information or to register for PCBFA events please call Stacy at
780-835-6799 or 780-772-0277!

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