Animal Drink Delivery

Concrete Waterers

Overview

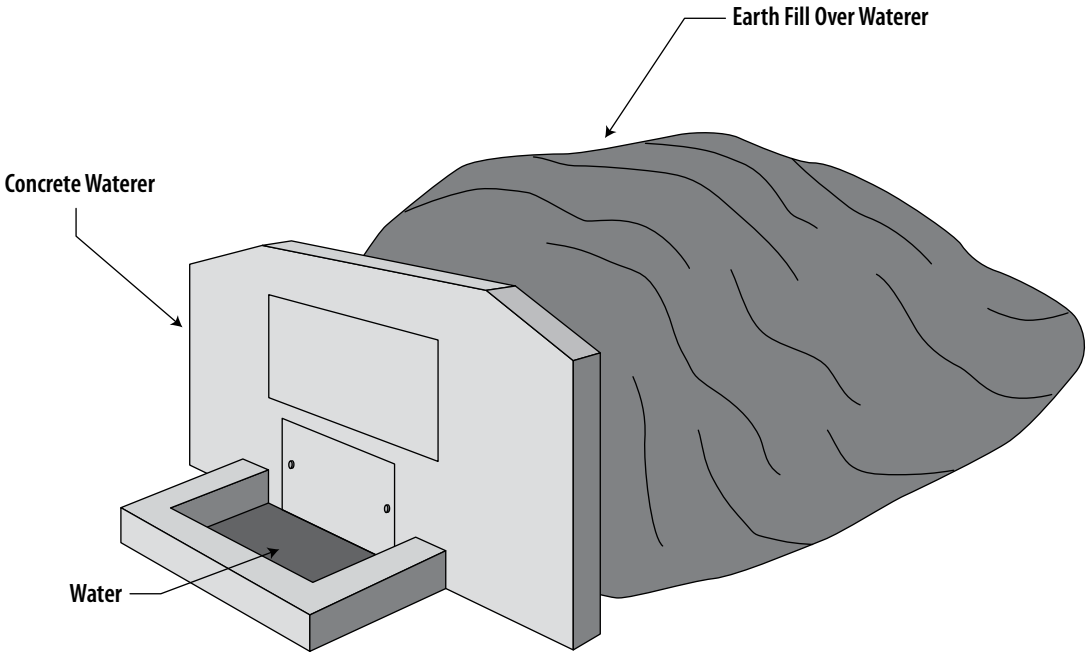
Concrete waterers provide reliable, durable watering sources. They can be installed as gravity-flow systems, eliminating the need for a power source. The area around the waterer can be easily protected with a geotextile and gravel surface. Fence-line installations allow watering two grazing areas with one waterer.

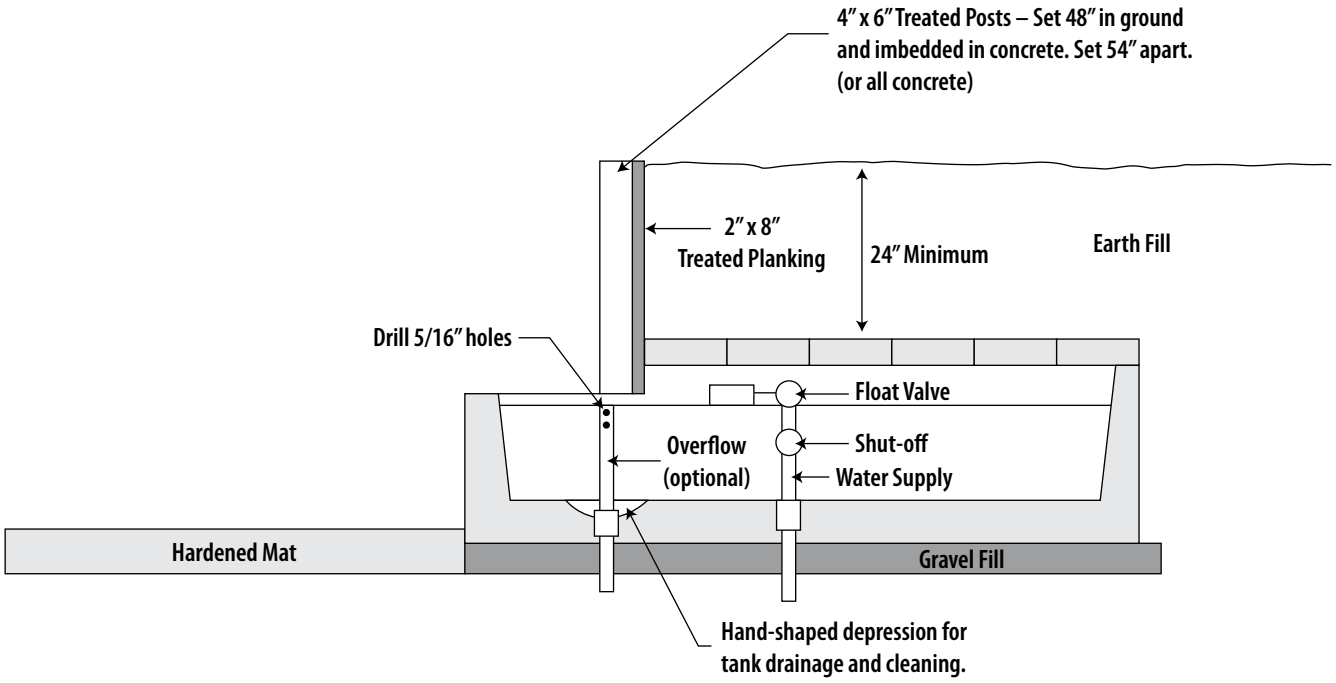
Advantages

- Allows relocation of the water source to reduce or eliminate direct stream and pond access by livestock
- Livestock often prefer to drink from a trough
- Long useful life
- Can be installed to be freeze resistant
- Does not require high water pressure
- Low operation costs
- Used in conjunction with fencing of pond, improves pond water quality and life of pond
- Minimal maintenance requirements
- Producer can install
- Multiple concrete waterers can be plumbed into a waterline if the grade is sufficiently steep
- Can be used with non-pressurized (gravity flow) and pressurized water sources with equal success
- Does not require a poured concrete pad
- Many tank models to choose from

Limitations

- Tanks are heavy, weighing between 2,300 and 3,000 pounds each
- Shipping costs may be high
- Not available at most farm supply stores
- If a pond is the water source, it must have a livestock water pipeline under, through or around the pond dam


Earth Fill Over Waterer
Concrete Waterer
Water


4" x 6" Treated Posts – Set 48" in ground and imbedded in concrete. Set 54" apart. (or all concrete)
2" x 8" Treated Planking
24" Minimum
Earth Fill
Drill 5/16" holes
Float Valve
Overflow (optional)
Shut-off Water Supply
Hardened Mat
Gravel Fill
Hand-shaped depression for tank drainage and cleaning.

Concrete Waterer

Design Considerations

The waterer should be placed on a well-drained gravel or sand site that offers some protection from the wind if the waterer will be used during the winter. The site should include an area of about 15 feet square in front of the waterer for cattle to stand. This pad area can be covered with geotextile cloth and gravel of 1-2 inches in diameter.

The waterer should be located at least 4 feet below the water level in the pond and beneath the dam for positive gravity flow. The pipeline should be buried below the frost line. After waterer installation, dirt will need to be piled around the back and sides to prevent freezing.

The pipeline can be placed either under the dam (new pond construction), or through the dam or out the side of the pond (existing ponds). Usually the trench is constructed from the waterer back towards the pond, stopping about 2 feet from the pond edge. The pipe is laid in the trench, starting at the valve at the waterer end. It is very important to seal the space around the pipeline within 20 feet of the edge of the pond using an anti-seep collar or bentonite clay.

The rest of the trench can be excavated into the pond, going deeper as necessary. The trench must extend far enough into the pond to place the pipe inlet where the water is deepest.

Installation instructions can be obtained by contacting your watershed specialist or viewing tand by viewing "Adopt a Drop: We Can't All Be Up a Creek" (*http://www.oznet.k-state.edu/kcare/KELP%20Water/KELPwaterer_files/frame.htm*). A description of installation is given in the K-State Research and Extension publication *Alternative Livestock Watering: Covered Concrete Water, MF-2737*, July 2006.

Limited Access Watering Points

Overview

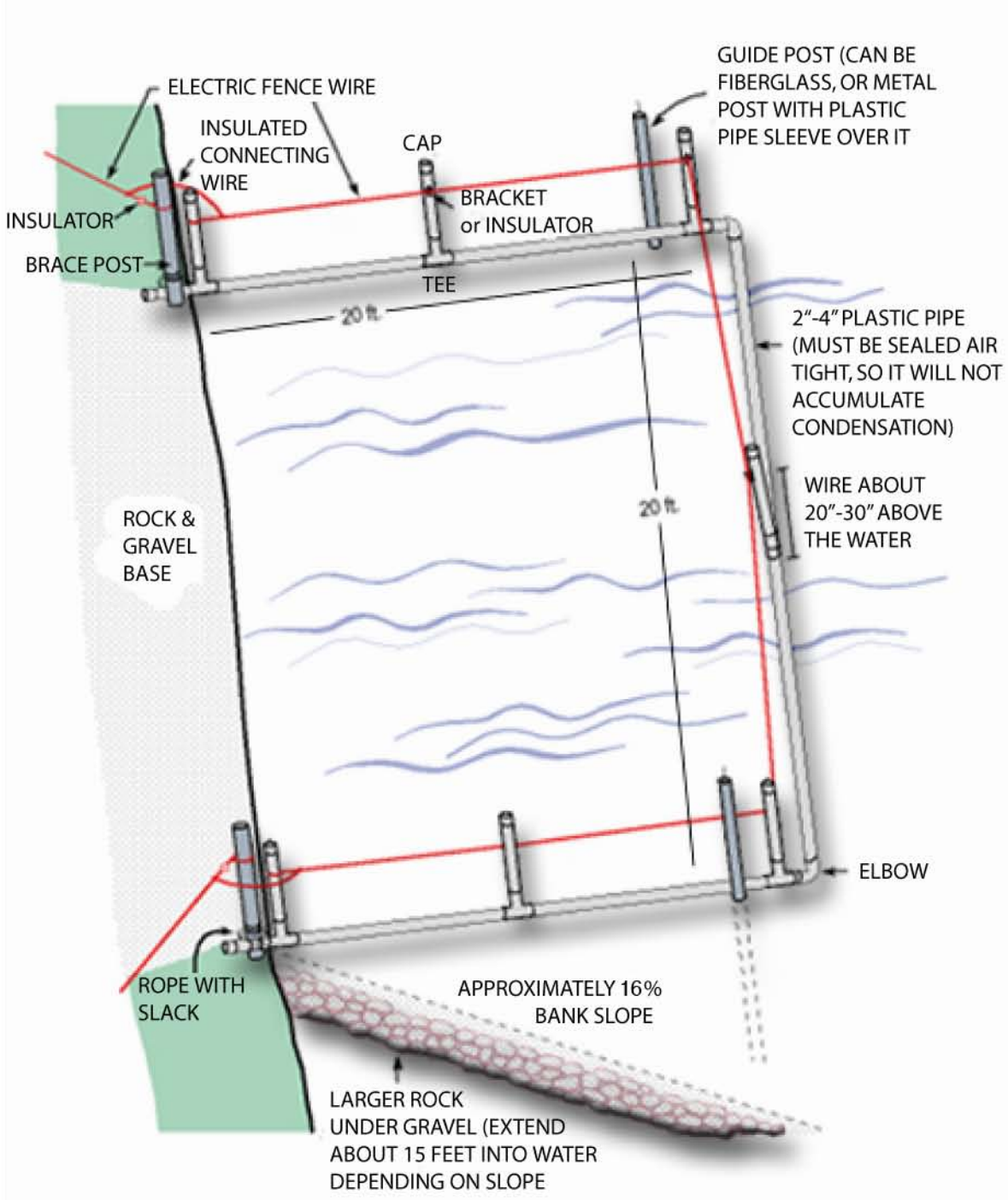
Ponds and streams are common sources of livestock water in Kansas. However, allowing unlimited access can cause severe bank erosion, poor water quality and other related problems. Cattle prefer clean water and avoid steep, muddy approaches to water sources whenever possible. Developing access watering points with a hardened surface and fencing is often fairly simple and solves many of these concerns.

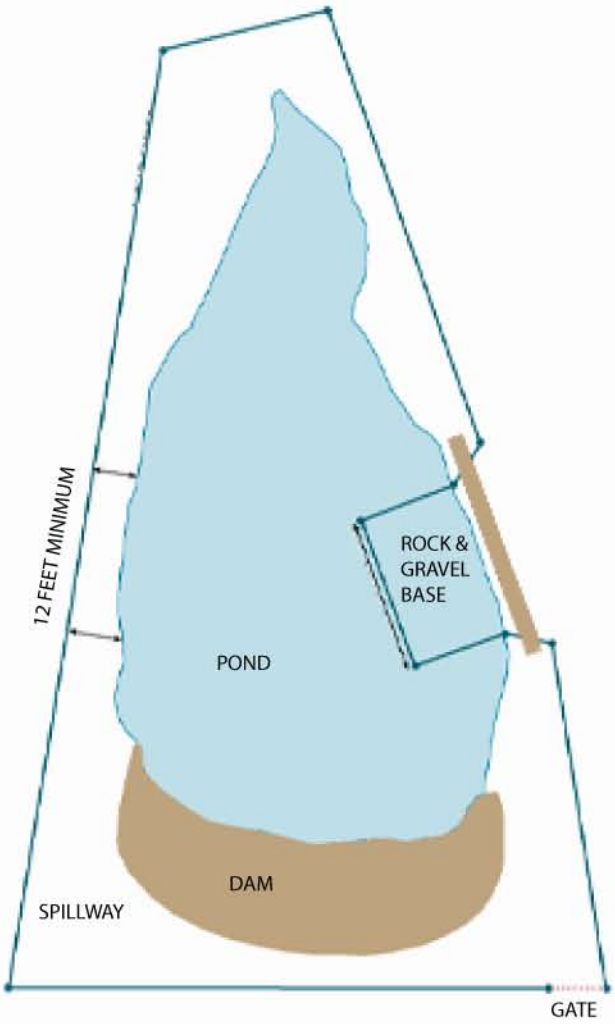
Advantages

- Simple and inexpensive
- Improved livestock safety and health, less foot rot and fewer leg injuries
- Reduced bank erosion
- Less sediment and fewer nutrients entering streams and ponds
- Extended pond life
- Applicable to new and existing ponds
- Increased water intake may mean better livestock gains

Limitations

- Not adapted to large streams
- Fence maintenance required when stream floods
- Few options for location of watering point
- Few examples in Kansas


ELECTRIC FENCE WIRE
INSULATED CONNECTING WIRE
CAP
GUIDE POST (CAN BE FIBERGLASS, OR METAL POST WITH PLASTIC PIPE SLEEVE OVER IT
INSULATOR
BRACKET or INSULATOR
BRACE POST
TEE
20 ft
2"-4" PLASTIC PIPE (MUST BE SEALED AIR TIGHT, SO IT WILL NOT ACCUMULATE CONDENSATION)
WIRE ABOUT 20"-30" ABOVE THE WATER
20 ft
ROCK & GRAVEL BASE
ELBOW
ROPE WITH SLACK
APPROXIMATELY 16% BANK SLOPE
LARGER ROCK UNDER GRAVEL (EXTEND ABOUT 15 FEET INTO WATER DEPENDING ON SLOPE


12 FEET MINIMUM
ROCK & GRAVEL BASE
POND
DAM
SPILLWAY
GATE

Limited Access Watering Points

Design Considerations

To encourage animal use, an access ramp or walkway should have a maximum slope of 6:1 run to rise (17%) or a 10 degree slope. Ramps as steep as 4:1 have been used. However, a flatter slope (8:1 to 20:1) is generally better when space allows, especially when conditions are icy. The ramp surface should be compacted and non-slip (crushed rock, gravel or concrete). A 3:1 slope (or flatter) for the sides of the ramp is preferable when site conditions permit.

Width may vary (recommendations range from 4 to 80 feet) but a good guideline is 10 feet plus one foot for each 10 head of cattle – for example, 55 feet for 50 head. Fencing is generally desirable to exclude livestock from other parts of the pond or stream, especially if they congregate and loaf during hot days.

A floating fence made of PVC pipe can be used to restrict acess to the pond reservoir at a cost of $200-300. A 16-foot stream crossing/access point for small streams, using gravel with geotextile and sand base, can be constructed for less than $500.

This practice may require permits. Please read the permit section of this handbook (p. 143).

References

Porter, M.D. and J.S. McNeill. 2006. Livestock water access point in pond fence. The Samuel Roberts Noble Foundation, Ardmore, OK. *http://www.noble.org/Ag/Livestock/Waterpoint/Porter_PondAccess.htm*

Natural Resources Conservation Service. 2003. Conservation practice standard: access road. Code 560. USDA. *ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/560.pdf*

Natural Resources Conservation Service. 2003. Conservation practice standard: heavy use area protection. Code 561. USDA. *ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/561.pdf*

Hardened Surface Access

Overview

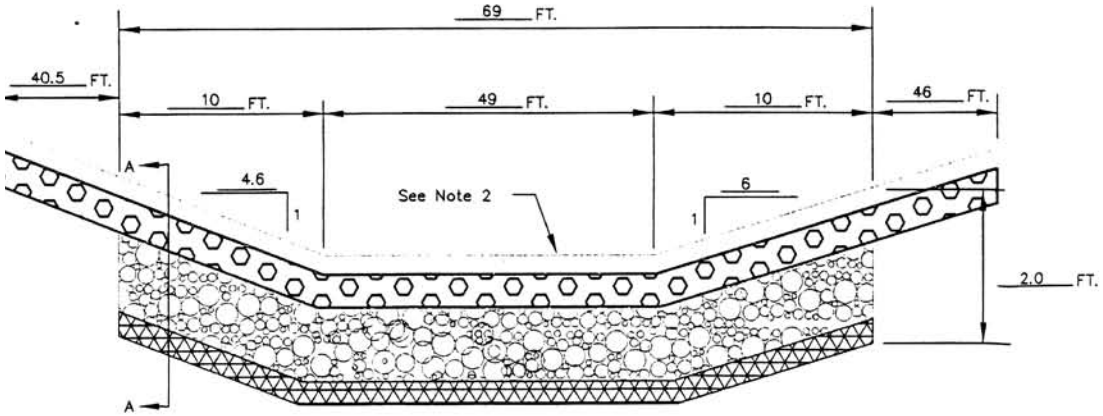
Properly designed and installed hardened crossings provide a safe, permanent area for livestock and equipment to cross streams without becoming bogged in the mud.

Advantages

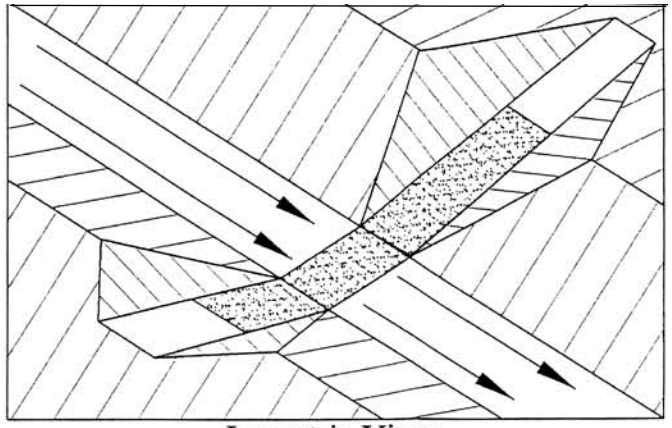
- Easily adapted to various stream sizes and locations
- Quick installation
- Long useful life
- Low maintenance
- Does not create stream obstruction
- Does not impair stream flow
- When used in conjunction with fencing, improves water quality by limiting livestock access to stream.
- Does not require poured concrete

Limitations

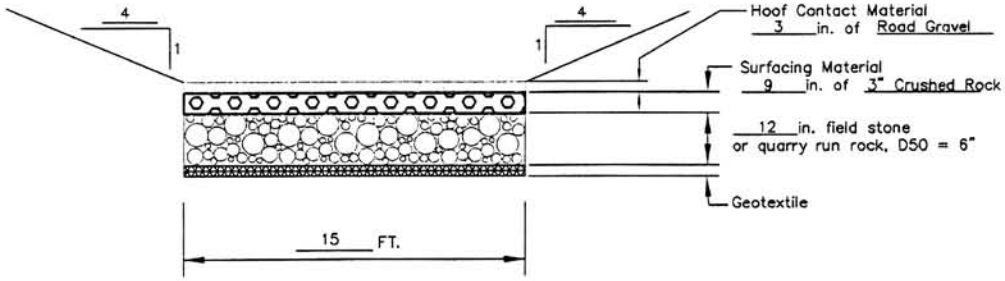
- Can be expensive



Profile Along Centerline of Crossing



Isometric View



Cross Section A-A

Notes:

1. Compact the surfacing material with a minimum of one pass of heavy wheeled/tracked equipment.
2. The cross sectional area of the creek channel shall not be reduced by the crossing. The top most layer of surfacing material shall be level to 0.2' below the channel elevation.
3. Only the geotextile, hoof contact material, and 3" crushed rock shall be installed on the approaches to the creek crossing.

Quantities

Excavation	663	CU. YD.
Sand and Gravel	–	CU. YD.
Quarry Run Rock or Field Stone, D50 = 6"	39	CU. YD.
Crushed Rock, D50 = 3"	66	CU. YD.
Hoof Contact Material, 3/4" Road Gravel	23	CU. YD.
Geotextile Fabric Class 4 (Woven) (Nonwoven)	260	SQ. YD.
Seeding	0.1	ACRES

Surface Material Gradation

Percent Passing By Weight	3" Size (inches)	6" Size (inches)
100	6"	12"
60–85	4.5"	9"
25–50	3"	6"
5–20	1.5"	3"
0–5	0.6"	1.2"

Hardened Surface Access

Design Considerations

Crossings should always be placed on riffles — never in pools — and should be placed perpendicular to stream flow.

The crossing surface should be at an elevation equal to streambed elevation. Geotextile fabric should be placed under the rock or gravel fill material.

This practice may require permits. Please read the permit section of this handbook (p. 143).

Super-Insulated Waterer

Overview

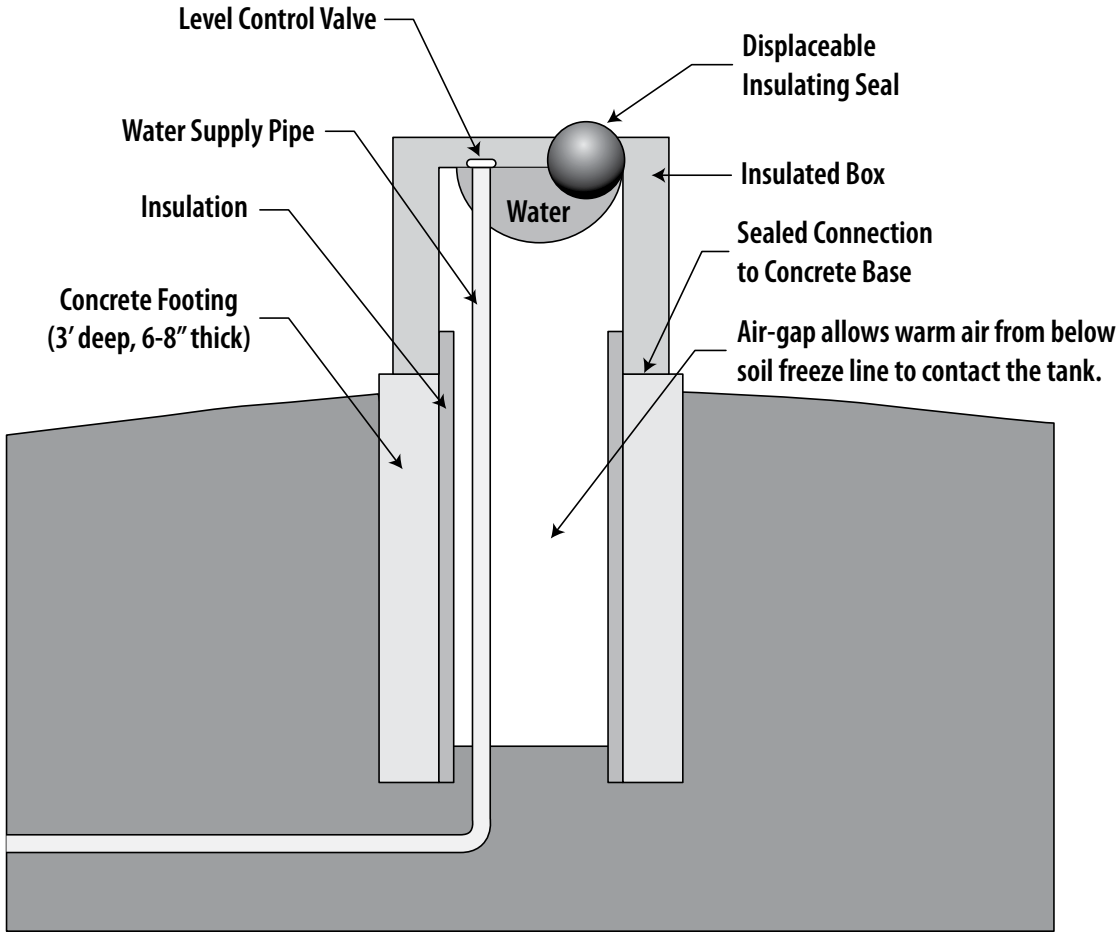
Ice-free water is a challenge for livestock producers in colder climates. Experience with many different types of waterers has led major companies and producers to consider products with much higher insulation values (R-factor – resistance to heat flow). Producers have reported problems with heating elements or burners in their waterers that are designed to preventing freezing. Greater acceptance of molded-plastic use around livestock has led to manufacture of super-insulated plastic waterers. In most cases super-insulated waterers have operated very well in the central U.S. without use of auxiliary electric heating elements or gas burners.

Advantages

- No need for supplemental heat to prevent freeze-up
- Available from local farm supply stores
- Availability of parts is good
- Livestock learn to use them easily
- Does not rust
- Uses UV-resistant molded plastic

Limitations

- Requires more frequent checking than other types of waterers
- Can be damaged if allowed to freeze repeatedly (left with no livestock)
- Requires a solid or concrete base


Level Control Valve
Displaceable
Insulating Seal
Water Supply Pipe
Insulated Box
Insulation
Water
Sealed Connection
to Concrete Base
Concrete Footing
(3′ deep, 6-8″ thick)
Air-gap allows warm air from below
soil freeze line to contact the tank.

Super-Insulated Waterer

Design Considerations

Combining use of a vertical "earth tube" into the ground below the waterer with the warmth of the water as it enters the waterer generally provides enough energy to prevent ice from forming inside the waterer. When water colder than normal groundwater temperature is used, such as pond water or spring water, the chance of freezing is greater.

These waterers utilize a variety of doors or covers to retain the intrinsic heat of the water and to seal cold air and wind out. Most waterers use either a large ball that floats tight against the inside of the tank or a door that the livestock open in order to access the water. Occasionally these doors or balls will freeze shut; however, a bump or tap by the producer will open the door or dislodge the ball. Livestock easily learn how to access the water.

These tanks rely on a significant volume of warmer water to prevent freezing, so the number of livestock per waterer should be adjusted to ensure that the waterer will refill periodically with warmer water. The producer will normally find that in the central U.S., a flow through (or use) of two or three volumes of water is required on the coldest days to prevent freezing. Most companies recommend at least 10-15 head per waterer. These waterers can be placed in a fence line to allow more livestock to use a waterer.

Producers are cautioned to check these energy free waterers twice a day; in the morning to make sure that livestock can access the water, and again near evening to assure the float and valve are operating properly.

Super insulated waterers should be placed in a location protected from the wind and snow to minimize heat loss and reduce the chance of freezing. A site exposed to the sun also reduces the probability of the waterer freezing.

Most super-insulated waterers require a solid base such as a concrete pad. A good gravel base around the concrete pad should be considered. Refer to "Geotextile and Gravel Surrounds" on p. 123.

Bottomless Tank

Overview

Bottomless tanks are large, open-topped tanks used for storing water and watering livestock. They are most often made of corrugated metal sections, such as grain bin sections, bolted together to form a large circular ring on site. A bottom is constructed inside the tank after it is assembled and placed in position. The bottom is usually made of bentonite clay, concrete or PVC plastic membrane.

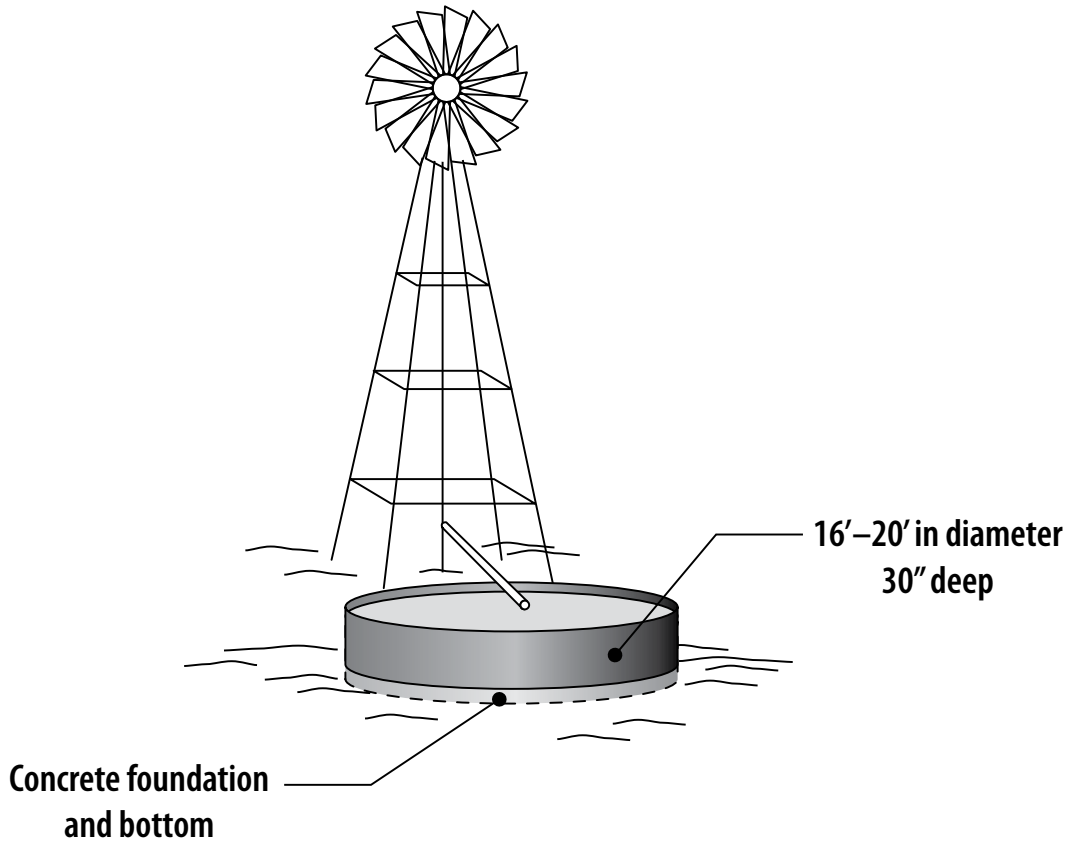
Because bottomless tanks come unassembled, very large (20 feet or larger diameter) tanks are possible. Tanks this size would be prohibitively expensive to ship if they were already assembled. Because of their water storage capacity these tanks can compensate for the variable water output of windmill and solar panel systems, assuring an adequate supply of livestock water at all times. Livestock drink directly from bottomless tanks.

Advantages

- Simple construction
- Easily adaptable to most sites
- Large capacity at comparatively low cost compared with other tanks
- Can be constructed with on-farm labor
- Serves as both water storage and drinking device

Limitations

- Tank will eventually need to be rebuilt due to soil-structure properties
- Can be relocated, but only with much time, effort and expense


16′–20′ in diameter
30″ deep
Concrete foundation
and bottom

Bottomless Tank

Design Considerations

Bottomless tanks are generally 25-30 inches deep and 20 feet or more in diameter. The lower part of the wall is embedded into the tank bottom material.

The tank bottom is susceptible to soil shifting and to changes in soil temperature and moisture. Minor maintenance is required on a regular basis. With substantial effort, tanks can be disassembled, moved, and reassembled at another location.

Tire Tank

Overview

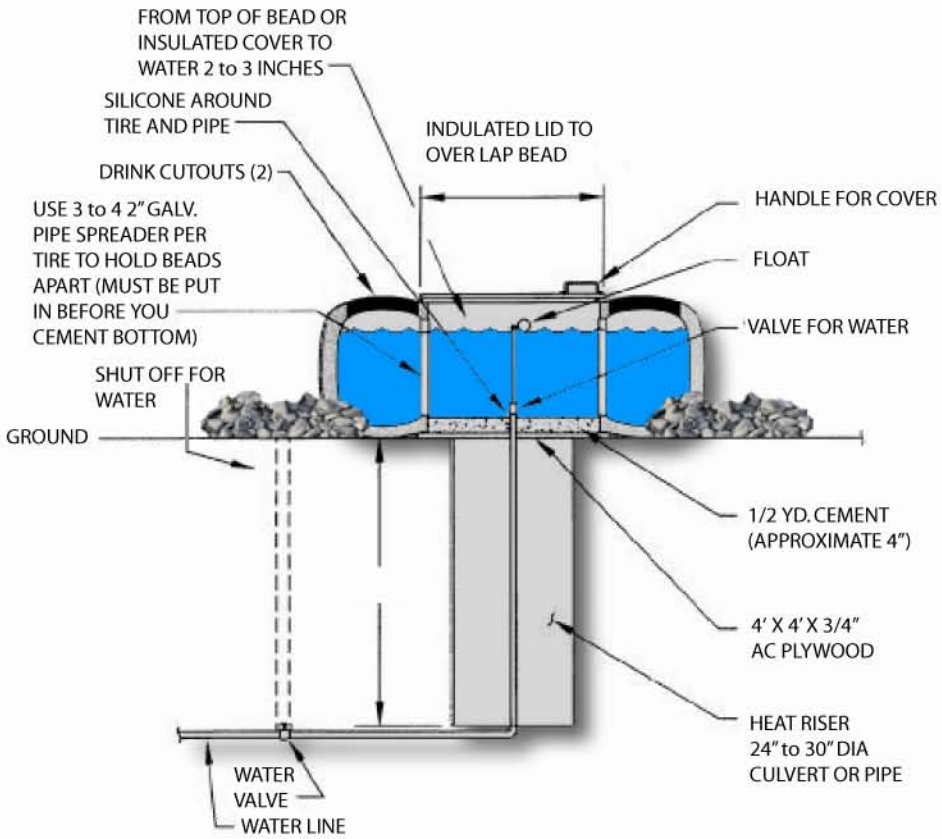
Used rubber tires from heavy earth-moving or construction equipment have been adapted for use as reliable livestock water tanks. They have proven to be durable, relatively inexpensive, and capable of being used with a variety of water sources. In numerous situations and settings, they are freeze-resistant in winter.

Advantages

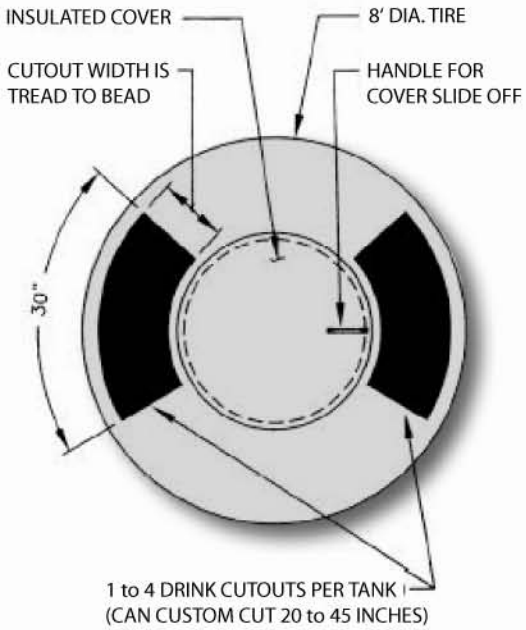
- Simple and generally inexpensive
- Available in a variety of sizes
- Durable and non-breakable; no sharp edges to injure livestock
- Can be used with waterlines from wells, springs, and new or existing ponds
- Freeze-resistant in winter if some protection provided

Limitations

- Heavy to handle during installation
- Limited size may limit water storage for larger herds
- Removal of part or all of one sidewall to make tank is usually difficult



SIDE VIEW



TOP VIEW

Tire Tank

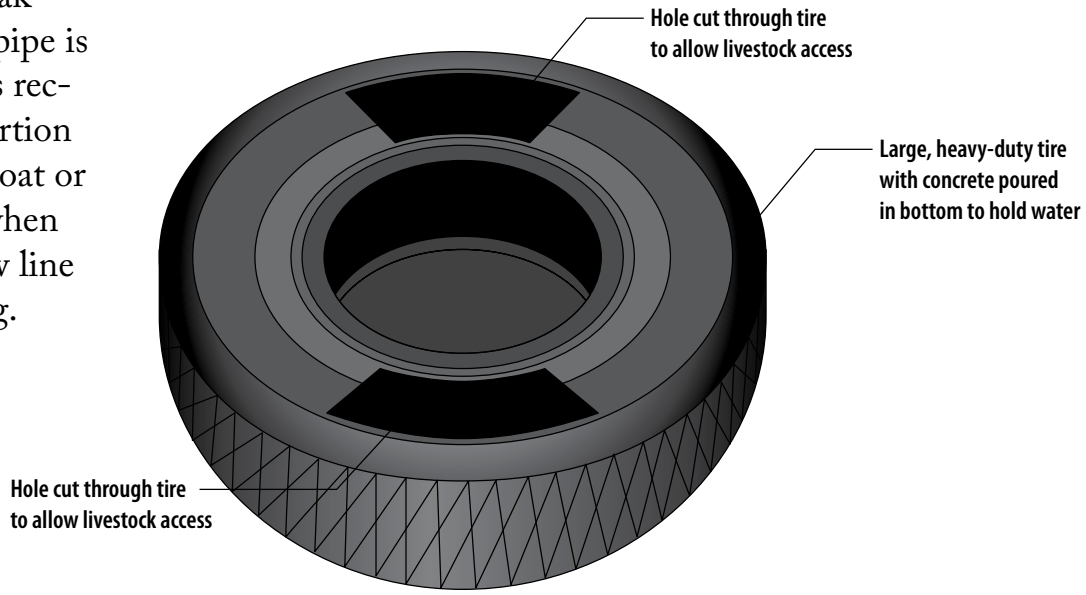
Design Considerations

Rubber tire tanks are normally supplied via pipeline from wells, springs or ponds. Choose tanks based on the size of the herd to be watered and the supply rate of the water source. Sizes range from 5 to 15 or more feet in diameter. Width of the tire (tank height) can be as much as four feet. The sidewall of the tire is cut away in part or entirely on the topside to allow drinking access. Cutting fewer holes will improve the freeze resistance of the tank while cutting away the entire sidewall will allow more livestock to drink at one time. Larger tires can be partially buried for some protection from freezing and to reduce the height of the tires, allowing access for smaller animals. Use a heavy-duty saw to cut and remove part or all of the sidewall on the upper side to allow livestock easy access to water.

The pipeline riser supplying the water (inlet) should be placed in the center of the tire or otherwise protected from breakage by livestock. A supply line of one to two inch PVC pipe is generally installed. A pipe joint at the base of the riser is recommended to allow easy replacement in case the top portion is broken. Most tire tanks are fitted with some type of float or shut-off valve. An overflow line is not installed except when the tank is part of a spring development and an overflow line is needed to carry away excess inflow or prevent freezing.

Use concrete, bentonite or other heavy clay to seal the lower side of the tire at ground level to prevent leakage. Tanks may be partially buried or soil mounded part of the way up the sides to reduce fluctuations in water temperature. Placing a layer of coarse gravel or other similar material around the tank will provide a durable, hardened surface and eliminate muddy conditions. Placing a "deck" of used railroad ties adjacent to the tire will help give small calves access to the water. Building a protective railing over the tank is recommended to keep animals from being pushed into the tank and away from piping and floats.

Most rubber tire tanks can be installed for a few hundred dollars. Some construction companies will give away used tires at construction sites simply to have them removed. Tires are also available from several suppliers. Examples of tire tanks can be viewed at *www.wenzelconstruction.com/rubbertiretanks.html.*



Fiberglass or Galvanized Tank

Overview

Portable tanks are an important part of livestock watering. Galvanized steel and fiberglass tanks are the two types commonly used. They are considered portable because they are reasonably light weight compared with other options. Empty tanks are easy to move for a temporary need. Tanks are suitable for watering a large number of animals at a time and are generally economical.

Advantages

- Water quality in a tank is usually better than cattle drinking directly from a pond
- A single tank can serve more than one paddock or lot
- Can be easily moved when needed
- Can be located/relocated to improve cattle distribution in a paddock
- A large tank allows several animals to drink at once
- Because of stored water the larger the tank the smaller the water delivery capacity needed to supply the animals
- Tanks work well for hauled water
- Portable tanks can be moved regularly to avoid mudholes developing around the tank

Limitations

- Soil around the waterer can become muddy from cattle dripping and depressions that develop and collect rainfall
- Manufactured tanks may be more costly than a used tire tank and are more susceptable to damage
- Galvanized steel and fiberglass tanks don't last as long as concrete tanks; probably not the best choice for a permanantly-located waterer
- Galvanized tanks will eventually rust
- Empty and unsecured tanks can be blown away or stolen
- Large tanks are awkward to move

Fiberglass or Galvanized Tank

Design Considerations

Tanks should be sited on well-drained level ground. Water should drain away from the tank to help avoid a mud hole around the tank site. Be sure the site is prepared by removing any rocks and making the area level. Sharp rocks can puncture the bottom of tanks. Galvanized and fiberglass tanks that are supplied by a gravity or pressured water source need a method to prevent overflow. Options include floats that will shut off the water supply when the tank is full or an overflow that drains by gravity into a low spot or draw that is at least 50 feet from the tank.

The tank should be sized to meet the needs for the number of animals it will supply. If the pasture is large, the tank should be able to supply all animals within about 30 minutes (a drinking event) without lowering the water level more than about 10 inches. This means that the water contained in the 10-inch water-level drop plus the inflow during the drink time are adequate to supply one drinking event.

During the winter, water in tanks will freeze on the surface and holes must be chopped through the ice so cattle can drink. When sufficient flow is available, tanks fed by groundwater should have an overflow to allow a trickle or low flow through it during the winter to minimize freezing. Groundwater is a fairly constant temperature of about 55 degrees in Kansas.

To avoid mud around permanent tank locations, the space around the tank should be protected by a hard surface or draining hard material such as gravel or geotextile-gravel surfacing. Rock that is about 2 inches in diameter will be uncomfortable enough that cattle won't linger by the water and destroy surrounding vegetation. Concrete is an excellent long life surfacing material but is expensive. Soil cement or fly ash should be less expensive options that provide a durable hard surfacing, but with a shorter life than concrete.

Portable tanks can easily be moved from time to time to avoid destroying grass and creating a mud hole. Water supply lines can be flexible above ground pipe.