THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXTENSION SERVICE

WQS-01-01

Agricultural and Biosystems Engineering

Selection of Beef Watering Systems

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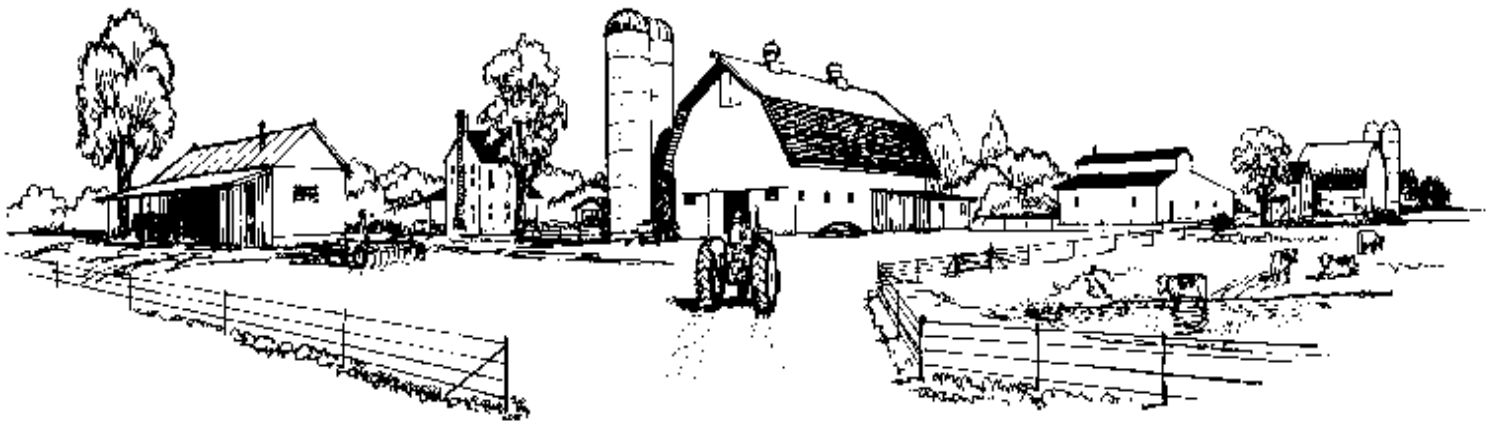
Why Should I Consider Changing from My Current Watering Method ?

Efforts to improve water quality have resulted in a new emphasis on the establishment of buffer strips and riparian zones along streams. In most cases the establishment of these zones requires the exclusion of livestock. Livestock producers who rely on streams to provide water for their animals must develop alternative watering systems before they can rotate animals into grazing paddocks that do not adjoin streams or ponds, or before they can implement best management practices that require livestock exclusion from streams.

Watering system location can also play an important part in improved grazing strategies, such as intensive rotational or paddock grazing. When using these systems, producers need dependable and economical methods of providing water to livestock at multiple locations. Even in traditional larger pasture systems, producers may want to consider additional watering locations. Research conducted in Wyoming showed that up to 77 % of grazing occurred within 1200 feet of the water source, while only 12 % of the pasture located farther that 2400 feet from the water source was utilized (Gerrish and Davis, 1997). This suggests that locating additional water sources may promote more uniform pasture utilization.



Producers who currently water cattle from ponds may also want to consider an alternative watering system. Research conducted by Montana State University indicates that more than 75 % of cows and calves prefer to drink from a watering tank rather than a pond, when both sources are similar distances from the cattle (Gordon, 2000). The researchers believe the cattle prefer watering from tanks because the water is usually of higher quality than that in the ponds. In addition, research conducted by Agriculture and Agri-Food Canada at Stavely, Alberta shows that cows, calves and steers watered from troughs had greater daily weight gains than did those drinking from ponds. This study found that animals drinking cleaner water from troughs averaged 23 % higher daily weight gains than did animals drinking from ponds (PAMI, 1999).

While water from a well or spring provides a cleaner supply than does a pond, even pond water quality can be improved significantly by excluding animals from the pond. Allowing animals to stand in a pond can greatly increase the amount of sediment suspended in the water. Suspended sediment, usually measured as total dissolved solids, may reduce the water's palatability, and in excessive amounts may reach unsafe levels for livestock. Table 1 indicates levels of total dissolved solids as well as sulfate, nitrate and nitrite generally considered safe for livestock (USDA, 2000). The quality of the water provided to cattle can be improved significantly by fencing the animals out of the pond and using the pond to provide water to a tank or trough with either a gravity flow or pump system.

Table 1 Maximum Contaminant Safe Levels for Livestock Water*

Water Contaminant	Total Dissolved Solids	Sulfate	Nitrate	Nitrite
Level Generally considered safe for most livestock	Less than 0.3% (3000 ppm)	Less than 300 ppm	Less than 440 ppm	Less than 33 ppm

* Adapted from the Animal and Plant Health Inspection Service Veterinary Services Info Sheet February 2000.

What Are My Options ?

Several options are available to producers when choosing a livestock watering system. These systems can be divided into three basic types; direct access, gravity flow and pump systems. The best system type for a particular producer will depend on many factors, including site layout, water requirement, availability of AC electrical power, as well as water source type and location.

Direct Access Systems

Allowing animals to water directly from a stream or pond is historically the most common livestock watering method in Tennessee. While this method is simple and inexpensive, it has limitations. Animals may have to travel long distances to drink when only one water access point is available in a large pasture. This is particularly a problem in rotational or paddock grazing systems. In scenarios where direct access is a viable option, benefits may be gained by the use of controlled and improved access points designed to better facilitate livestock watering. University of Tennessee researchers have shown that greater amounts of nitrate, ammonia and fecal coliform enter streams when cattle are allowed full stream access when compared to situations with limited or no stream access (Powell, 1998). The limited access situation used in the study provided one designed stream access location for cattle, while the remainder of the stream was fenced to exclude cattle. The study found no significant difference between full exclusion and limited stream access systems in terms of ammonia and fecal coliform mass additions. In fact, the ammonia and fecal coliform additions to the stream from limited stream access or no stream access situations were found to be no different from the control location that had no cattle at all. This research indicates that cattle producers may be able to realize many of the water quality benefits associated with complete exclusion of cattle from streams by using limited direct access systems. It is expected that reduced stream bank damage, reductions in erosion and the resulting sedimentation, improved riparian areas along streams and safer animal access to streams can all be realized by excluding animals from the stream except at well-designed and constructed improved access points. Such access points may be constructed in full crossing or limited access configurations. Crossings are underlain with synthetic geotextile material and finished with gravel to provide an all-weather stream access and crossing area. Electrified chains are used to prevent cattle from going up or down the stream from the access area.

Gravity Systems

When a water source is higher than the desired usage point, gravity flow systems may be a good choice. Like direct access systems, gravity systems are relatively simple and inexpensive, since no external power source is required to move the water. Most gravity systems consist of a tank equipped with float valve. The tank must be located lower than the water source. The water delivery pipe should be sized such that adequate flow into the tank can be achieved. When building a pond, the outlet pipe should be installed during construction of the pond. It is difficult to install a pipe through a pond berm or levee after construction due to potential leakage problems. Ponds or springs may work well as gravity supply water sources, while streams are usually at the lowest point in a pasture and seldom can be used in this manner. Gravity tank systems can be installed so as to be freeze-proof in all but the coldest weather by using insulated

tanks, or by employing electric heaters or solar-powered bubblers. Several types of freeze-proof tanks are currently available. Heated tanks may not be feasible, since electricity to operate the heater may not be readily available. Many freeze-proof tanks are simply well insulated, and have some type of closure, such as floating balls, to seal off the water opening and help prevent freezing when animals are not drinking. An air-gap heat well is used to insulate the water delivery pipe where it enters the tank and to allow warmer air from below the soil freeze line to contact the tank. Allowing continuous water flow through the system will also reduce freezing problems. This may be an option when using a spring as the water source, but is usually not feasible with a pond.

Pump Systems

Standard AC current electric pumps are usually the best pump choice. AC pumps are hard to beat for providing livestock water conveniently and dependably. The use of AC electric pumping systems is limited however, by the proximity of electric power to the water source. AC-pumping systems may use ponds, springs, streams or wells as their water source. The distance limitations vary with the power requirement of the pump to be used. As the distance between power supply and pump location increases, larger electric wire is required to avoid excessive voltage drop. The distance at which it becomes too costly to install an AC system depends on the pump current requirement and the cost of other feasible alternative systems at a given location. The pump amperage requirement (and therefore wire size requirements) can be minimized by selecting 220-volt pumps over 110-volt units, when a 220-volt power supply is available. Submersible and standard suction-lift model AC electric pumps are available for pressure water systems. Submersible pumps are commonly used in wells, but may be installed in ponds or streams with proper pump selection. A submersible pump does not require priming and is freeze-proof because the pump is submerged below the water's surface. Non-submersible suction-lift pumps must be placed close enough to the water's surface to ensure that the elevation difference between the water's surface and pump does not exceed the lift capacity of the pump. Non-submersible pumps must also be protected from freezing if they will be operated during cold weather.

When AC electric power is not available, DC solar pumping systems, ram pumps, nose pumps or sling pumps may be considered. Each of these systems has advantages and disadvantages. The best choice for a given farm will depend on the situation. For more detailed information about available pumping system alternatives refer to The University of Tennessee Agricultural Extension Service publication PB1641 *Selection of Alternative Livestock Watering Systems* (Burns and Buschermohle, 2000). This publication provides descriptions of livestock watering system alternatives, and discusses some of the positive and negative aspects of each. Solar pumping systems have been shown to work well in Tennessee, and to provide reliable water supply in remote locations. Solar pumping systems can be used to supply water to livestock from

wells, ponds, springs and streams. For detailed information about the use of DC solar pumping systems refer to The University of Tennessee Agricultural Extension Service publication PB1640 *Solar-powered Livestock Watering Systems* (Buschermohle and Burns, 1999). Both PB1640 and PB1641 can be accessed at www.utextension.utk.edu/publications/livestock.htm.

Take Home Message

Many alternatives to watering cattle directly from surface water sources are available. Using an alternative watering system to limit cattle access or to exclude cattle from streams and stream-side riparian areas or from ponds can:

- ★ **Improve stream water quality**
- ★ **Provide safer watering conditions for cattle**
- ★ **Decrease stream-bank erosion**
- ★ **Improve wildlife habitat**
- ★ **May improve animal performance (when providing a higher quality water source)**
- ★ **Improve pasture utilization (when providing additional watering locations)**

References:

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E12-2015-00-037-01