Watering Systems for Grazing

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Most of the people who put in a pasture watering system say, "why didn't I do this sooner! It makes things much easier—the cattle and manure stay in the pasture, the system is not that costly and is mostly trouble free."

There are two basic approaches to watering systems on grazing land: either take the water to the animals, or provide limited access for the animals to go to the water.

Benefits of moving water to the livestock on pasture

Providing a clean, convenient water source in pastures separate from surface waters will benefit both livestock and water quality. Livestock perform better with clean water. Moving watering systems around the pasture improves grazing efficiency. Cattle will spend most of their grazing time close to a water source, so moving the water reduces overgrazing and better utilization of the entire pasture. More uniform grazing helps spread urine and manure around the entire pasture. When water is frequently moved, there is less chance of creating a mud hole by the water tank and a better opportunity to allow vegetation to re-grow in these areas. Systems that encourage livestock away from surface waters by moving water to the livestock also protect riparian areas by reducing erosion and sediment.

Table 1 Dairy Animal Water Requirements

Animal	Gallons of water	Range of gallons of water
Dairy Cow	20	15-25
Beef Cow Pair	15	12-20
Yearling Bovine	10	6-14
Horse	10	8-14
Sheep	2	2-3

Putting a movable watering system in pastures

It sounds expensive, but conveying water to grazing paddocks is often the least expensive method of increasing grazing capacity. There are numerous options and combinations of systems that work, and many are inexpensive and low maintenance. Here are some pointers that can help you find the best options for your situation:

- Determine the distance from the back corner of the pasture to a water source. If it's more than 900 feet, cattle will come to drink as one large group. If you are intensively grazing and it's less than 900 feet to water, animals will come one at a time. This has a big impact on the size of the tank and the recharge capacity needed.

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- The amount of water necessary is determined by the number of animals multiplied by the amount of water per head per day. (See Table 1.) The important point is that intake will vary by more than 400 percent from wet, cool days on lush forage to hot, dry weather when forage is drought-stressed. It usually doesn't pay to build a system where every pasture supplies the maximum amount of water. Instead use smaller supply lines that deliver water more slowly and use a bigger tank.

Daily water requirements

Next, consider the water source and options to move it to the paddocks. In Michigan, most farms have a good well with a main electric pressure pump. Utilizing existing water sources and any existing pumps is generally best because you only need to add pipe and connections to move water from a barn or well to the pastures.

Table 2 helps determine the size of pipe needed for various water flows. Should you bury the pipe or leave it on top of the ground? There is no right answer. Consider all options and choose a solution that works for you. Grass will grow over the pipe and keep the water cool but the plastic pipe does need protection from cattle and equipment traffic.

Sizing tanks and plastic pipe

You should take several things into account when determining the size of the system. On intensively grazed pastures where animals will come to drink as individuals from less than 900 feet away, provide a flow rate that supplies the daily needs in 4 to 8 hours and use a small tank that allows 2 percent to 4 percent of the herd to drink at a time. On extensive or large continuously grazed pastures where the water is more than 900 feet away, provide a tank than holds a minimum of 25 percent of the herd's total daily needs and allows 5 percent to 10 percent of the herd to drink at one time. The tank refill time should be one hour or less.

Let's do the math to see how this works:
If we have 40 beef cows and want to allow 20 gallons of water per head per day, 800 gallons of water needs to be delivered to the tank. If we want the tank to refill in 60 minutes or less and to hold 25 percent of the total daily needs, then 200 gallons must be pumped in 60 minutes or less.

200 gallons ÷ 60 minutes = 3.3 gal/minute that need to be pumped

If the distance from the well to the tank is 1,000 feet, the chart below shows that a .75-inch pipe is necessary.

Table 2 Gallons Per Minute

	Pipe Length									
Pipe Diameter	100'	200'	350'	500'	750'	1000'	1500'	2000'	3500'	1 mile
.5 inches	4	3	-	2	-	-	1	-	-	-
.75 inches	8	8	6	5	4	3		2	-	1
1 inches	13	13	10	8	7	6	5	4	3	2
1.25 inches	23	23	21	19	15	12	9	8	6	4
1.50 inches	30	30	30	26	22	19	15	12	9	7
2 inches	50	50	50	50	43	37	29	25	18	15

One more example:
60 dairy cows x 25 gallons of water per head per day = 1,500 gallons of water per day. If you're 1,500 feet from the water source, the cows will travel to the water source together. Therefore, you should plan on a 4-hour (240 min.) re-fill time.

1,500 gal ÷ 240 minutes = 6.25 gal per minute

According to Table 2, a 1.75-inch pipe is needed to deliver the desired quantity of water. (Note that if the water has to go up a significant hill, it may take a bigger pipe because the flow rate will be decreased.)

Every situation is different but these examples provide a good starting point. Here are some other important considerations:

- Be sure the pump capacity can move the amount of water needed in a reasonable amount of time. The water pump should not run more than 4 to 6 hours per day.
- A bigger tank can use a smaller pump as less water per minute is needed.
- Always, always have an alternative watering plan in place for situations such as really hot weather or unexpected pump repair time.

Alternative sources & supply ideas

What can you do when you don't have electric power or a good pressurized well? Provide livestock with solid footing protected areas and access to a creek.

Ponds and dams can also help solve watering problems. Allow a protected place for cattle to drink or move the water from a pond to a water tank. There are a number of ways to move surface water to a tank, including cattle-powered nose pumps, gravity, ram pump, solar, wind, sling, 12-volt sump pump and even small gasoline-driven pumps.

Be sure to do a cost analysis of the options available. In many cases, there is a low-cost watering option that can increase grazing capacity. Even paddocks a mile away can be watered by a 1,000-gallon tank on a wagon and hauled daily for a couple weeks. A tank on a wagon is also a great back up system to have in case of a pump failure.

Limited access of livestock to surface water

(Following is an excerpt from: A Guide to Managing Pasture Water: Stabilized Stream and Pond Access Sites, Dr. Jim Russell, Department of Animal Science and Shawn Shouse, Field Specialist, both from Iowa State University. For the complete article visit www.iowabeefcenter.org)

Benefits of stabilized stream and pond access sites

Development of a stable access site to a stream or pond allows grazing animals access to water sources at selected sites while providing the opportunity to protect the remainder of the banks with exclusion fencing. This action may lessen the potential for erosion from stream banks or pond dams by maintaining vegetation and eliminating hoof traffic in sensitive areas.

Because of the discomfort caused by the footing and/or the confined areas associated with stabilized access sites, use of stabilized access sites may reduce the proportion of time cattle are present in pasture streams and ponds. As a result of this change in cattle distribution, the amounts of manure and urine deposited in the water source will be reduced, lessening the risks of pollution from manure nutrients and health problems from pathogenic organisms.

In addition to improving water quality, development of stabilized access sites on streams may provide crossings for animal movement or truck and machinery traffic.

Selecting the Best Stabilized Access Structure

There are a number of approaches to developing stabilized access sites. The best option for you will depend on the characteristics of the site, purpose(s) of the structure, desired length of use, the level of investment and availability of labor for construction and maintenance.

Options to stabilize access sites to streams or ponds

Rock and Gravel
Stabilized access may decrease the potential for stream bank and pond dam erosion.

Advantages
- Materials may be less expensive than other methods, if present on farm
- Can be constructed without diverting water
- Appropriate for streams and ponds
- Good longevity, if properly installed

Limitations
- Requires considerable excavation
- Materials may sink into mud, if not supported with geofabric
- Difficult to maintain level surface needed for cow footing and preventing stream turbulence
- Difficult to maintain access ramps

Geofabric, webbing, and gravel

Advantages
- Webbing provides 6-inch deep cells that hold gravel
- Geofabric under webbing prevents gravel from mixing with mud
- Requires less excavation than rock alone
- Can be constructed without diverting water
- Relatively easy to construct with a level surface
- Easy to extend up access ramps
- Good longevity, if properly installed

Limitations
- Materials are expensive
- Inappropriate for ponds
- Requires annual maintenance

Construction tips
- Visit www.iowabeefcenter.org/content/grazing20%management.html

Guidance for Michigan

If farm conditions cause pollution, the Michigan Department of Environmental Quality (MDEQ) may investigate to determine if the farm operation is in compliance with water resource protection laws and take action as appropriate. Construction of a livestock crossing or access points may require a permit from the Land and Water Management Division at the MDEQ. Regional MDEQ staff members are available for pre-planning consultation that can assist producers in site specific considerations for workable options. Call MDEQ at 1-800-662-9278.

For more help, contact your local USDA Natural Resources Conservation Service, Conservation District or Michigan State University Extension. For more information visit http://beef.msu.edu/

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