Putting Water to Work

With the right equipment, cattlemen can implement watering systems, improve forage utilization.

by ***Crystal Albers***

Cattle producers can spend countless hours crunching numbers, reviewing research summaries and consulting specialists to determine the best way to manage their cattle and make a profit. Re-evaluating and updating their facilities and equipment is one way to improve efficiency and unlock profit-making potential.

But before producers begin setting posts and ordering parts for more permanent, more costly structures, they may want to consider less permanent equipment to improve forage utilization and employ one of the industry's most underutilized nutrients — water.

"We sometimes forget that water availability is a grazing management tool," says Ben Bartlett, a Michigan State University (MSU) Extension specialist and author of *Watering Systems for Grazing Livestock*. "How far animals have to travel for water has a tremendous impact on their grazing effectiveness."

Bartlett, like many forage experts, recommends implementing strategically located, easily accessible watering units throughout grazing paddocks to improve grazing efficiency and pasture productivity as well as to reduce environmental damage. Numerous studies contend that creating a water source closer to the grazing area will increase the amount of harvested forage per acre. If cattle are forced to travel long distances to water, uneven grazing occurs, with overgrazing near water and undergrazing in the paddock's far corners.

"The farther they have to go for water, the closer and more time they spend around the water, and the less time they spend grazing in distant, underutilized areas," Bartlett says. And, he adds, cattle tend to travel as a herd when walking longer distances to more permanent watering units, increasing demand on forage, compacting the soil around the waterer, and increasing the demand on the water tank and the system's ability to "recharge." Plus, calves and weaker animals tend to receive inadequate, if any, water, since they are forced away from the already exhausted trough, causing undue stress and productivity losses. However, if centralized watering units are placed closer to the herd, cattle will utilize available forages more effectively and will be more likely to drink individually, decreasing stress on cattle and on the water tank.

According to a study conducted by the University of Missouri (MU) Forage Systems Research Center (FSRC), water sources should be placed within 600 to 800 feet (ft.) of all areas of the pasture for optimum grazing uniformity. Of course, the recommended distance increases in drier environments across the Plains and into western states, where forage productivity decreases and cattle will travel a half mile or farther for water, says Jim Gerrish, lead author of the study and independent grazing consultant based in May, Idaho. Regardless of differences in geography, "energy used for extra walking takes away energy that could be going to performance functions rather than just maintenance."

Harnessing that wasted energy makes cattle more efficient and lowers feeding costs, creating economic value.

Table 1. Estimated water consumption by various groups of cattle

Livestock	Winter (gal. per day)	Summer (gal. per day)
Cow-calf pairs	13	30-35
Dry cows	10	30
Calves*	6	12
Growing cattle, 400-800 lb.	8	12-24
Bred heifers, 800 lb.	9	24
Bulls	13	30-40

Source: Pfost, Donald et. al., "Pumps and Watering Systems for Managed Beef Grazing," Environmental Quality publication (EQ380), University of Missouri, Nov. 15, 2000.

* Water consumption for calves is estimated at 1½ gal. per day per 100 lb. of body weight.

Getting started

"Understanding animal behavior and its relationship to water can give cattlemen a lot more power in how they manage their grazing systems and their animals and how they set up their enterprises," Bartlett says. But watering setups can vary from pasture to pasture.

"No one way is right for everybody, but there are lots of options people want to consider before they [get started]."

The first step in designing a water system, MU specialists suggest, is to determine the herd's water needs. Water requirements can vary with cattle's size and age, dry-matter intake (DMI), moisture content of feed and forage, air temperature, and other factors (see Table 1).

Then, Bartlett recommends analyzing the pasture area to determine if it can meet those water needs. "Take one step back, grab a cup of coffee, and say, 'What's the weak link in my system?'" he advises. "Before I go fix my water system and get a Cadillac, I want to make sure my fence system isn't a Model T. I want to bring everything up to speed."

Next, he says, focus on bringing more watering options to the pasture, deciding whether to utilize underground sources and/or surface sources such as ponds, lakes and/or streams.

Choosing a system

Both Gerrish and Barrett consider piping water from a well to be the most flexible and cost-effective watering option — if it's available. However, many areas may not be conducive to well development, and some isolated pastures don't have access to electricity.

Shawn Shouse, an Extension ag engineering specialist for Iowa State University (ISU) has spent the last four years experimenting with a variety of alternative watering systems utilizing surface water.

"We have a lot of producers with pastures in remote parts of the farm where they don't have access to electricity or pressurized water systems," Shouse says. So, the Extension team began looking at ways to provide water throughout the pasture using the research farm's fenced-off pond, trying everything from gravity-flow systems to solar-powered pumps.

With gravity-flow systems, a cattleman who has a pond uphill from the pasture can harness free energy, or gravity, to move water. Whether simply driving a pipe through the pond dam, siphoning water in other ways or using an elevated water reservoir, gravity does provide some low-pressure options if the land is willing to cooperate.

Shouse says siphoning water up and over the pond dam has proven to be a fairly easy, relatively inexpensive way to move water. And, if producers have access to a nearby tile line, he recommends constructing a tile-line intercept to utilize the relatively high-quality water flowing through the line. However, there are drawbacks to gravity-flow systems.

"If you have a landscape where you can construct a pond fairly high, it's just incredible how far and where you can get water to flow by gravity," Gerrish says. "In a nice, rolling landscape, I like the gravity systems, but when you get out into flatter land, gravity doesn't take the water where you need it to go."

Producers who must move water up and out of the surface source can choose from a variety of pumps, depending on their unique needs and changing landscapes.

"If you have access to electricity, you can't beat the convenience and flexibility of an electric pump," Shouse says. "The cost of the electricity to pump the water is very, very small; 50¢ worth of electricity will water a cow for a long time. But, if you don't have access to electricity, there are a lot of other options you can look at."

A variety of pumps, from inexpensive bilge pumps to submersible pumps, can be powered by animals, batteries, solar energy, wind, moving water or fuel. Each system has its advantages and limitations depending on the producer's needs and available resources. Bartlett recommends speaking with an Extension agent or Natural Resources Conservation Service (NRCS) specialist to determine what system will provide sufficient pressure to push water through hundreds of feet of piping at a rate that will satisfy the animals' thirst.

"There are no absolutes. Just look at your water options and figure out which works best for you. Water systems are so variable. Every particular piece of land or corner of your farm has its own unique water challenges and opportunities," Bartlett says.

Water in motion

Regardless of what watering system is used, pipelines are needed to move the water from the source to its intended outlet in the pasture. Most producers using management-intensive grazing (MiG) systems use plastic pipe, installing it above ground for portable units or burying pipe below the frost line for more permanent watering fixtures.

Bartlett says technological advances in high-tech plastic pipes have allowed producers to begin using aboveground pipe during the growing season, simply placing it along fencerows to be shaded by forage, and draining the line in the winter. He suggests cattlemen use pressure-rated, UV-stabilized pipe for use above ground, ensuring the pipe is protected from vehicle and animal traffic.

MU specialists caution that the size of the pipe should be matched to the demand placed upon it. Pipes less than 1 inch (in.) in diameter are rarely used, with at least 1½-in.-diameter pipe recommended for distances more than ¼ mile. The university specialists recommend supplying 2 gallons (gal.) per minute (gpm) for every animal that can drink at the trough at once. For example, if three animals can drink from the water tank at one time, plan on supplying 6 gpm. Also, pipelines and watering systems should be able to supply the peak demand of the herd in 12 hours or less.

Gerrish recommends planning for expansion. "The biggest, common mistake I see is people not putting in large enough pipe. Work with an Extension agent or engineer for pipe recommendations, but I always tell people to increase the recommended pipe size by one increment just to be safe."

Bartlett also cautions producers to have a backup plan. "I don't care what kind of system you have, what can go wrong will go wrong. With any water system, you can build it bulletproof, but you better have a plan B."

Although different watering systems will work for different people, Bartlett says all producers should consider water a focus rather than a barrier when it comes to grazing management.

Says Bartlett, "This is kind of all new stuff. Water has always been on the back burner, but now water is becoming the next opportunity, the next weak link to work on."

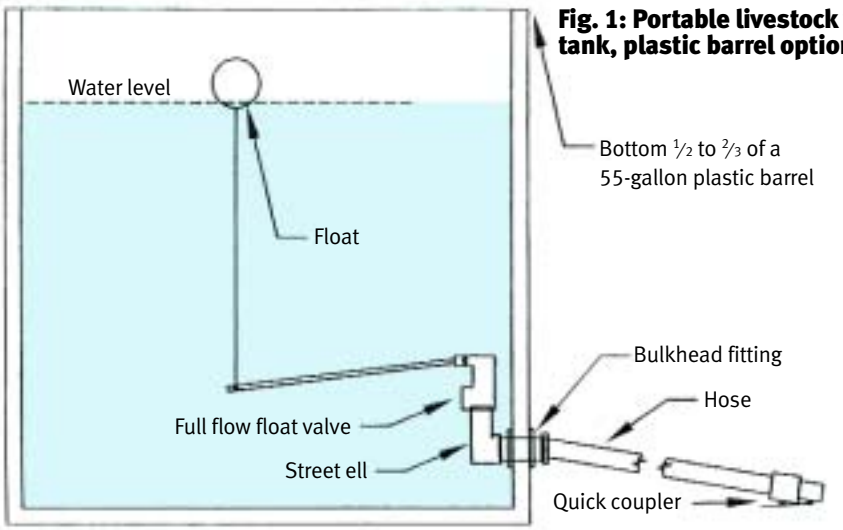

Fig. 1: Portable livestock water tank, plastic barrel option*

Source: USDA NRCS. This standard engineering drawing is an example of resources commonly available through NRCS.
*Cross-sectional view. Not to scale.

Editor's Note: *Contact Bartlett at (906) 439-5880 or bartlett@msue.msu.edu for more information on watering systems or to order the booklet,* Watering Systems for Grazing Livestock. *Gerrish can be reached at jrgerrish@custertel.net for more information.*

Funding an improved watering system

Development costs of improved watering systems could cause some ranchers to shy away from implementation. Thankfully, government agencies like the Natural Resources Conservation Service (NRCS) have made funding available for ranchers looking to implement improved watering systems — systems that not only benefit cattle, but wildlife and the environment as well.

Mark Kennedy, of the Missouri NRCS in Columbia, says funding is available to producers who perform NRCS practice standards such as fencing off ponds and streams and improving soil erosion conditions. However, funding levels, programs, sign-up periods and conservation regulations vary greatly from state to state. Kennedy suggests checking with local U.S. Department of Agriculture (USDA) Service Centers or Extension agents for a complete list of available funding. Local soil and water conservation districts and other stewardship programs could have funding available in some areas. He also advises producers to consider funding options in programs like the Grassland Reserve Program (GRP), the Wildlife Habitat Incentives Program (WHIP), the Conservation Reserve Program (CRP) and, especially, the Environmental Quality Incentives Program (EQIP).

EQIP provides financial and technical help to eligible farmers and ranchers wanting to implement structural and management practices while conserving natural resources. EQIP contracts are available in one- to 10-year terms and may cover up to 75% of the costs of some conservation practices, and incentive payments may be procured for up to three years. Producers with limited resources and beginning farmers and ranchers may be eligible for cost-share arrangements where the government could pay up to 90% of costs.

For more information regarding federal programs, sign-up forms and regulations, visit *www.nrcs.usda.gov/programs*. To contact a local USDA Service Center, visit *http://offices.usda.gov*.