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Designing the Right Watering System for Your Cattle

Dr. Dirk Philipp, Assistant Professor

Water is often an overlooked and neglected factor in livestock operations, and watering systems on farms are sometimes in bad shape. While most producers ensure that pasture, hay and additional feed are of reasonable quality, some ignore the importance of clean drinking water to the herd. Drinking water quality and quantity directly influence animal health, grazing distribution and forage management. Failure to get enough water to cattle will reduce animal performance more quickly and more severely than any other deficient nutrient. A rule of thumb is to provide livestock with one gallon of water per pound of dry matter consumed. Cattle's access to clean water increases the intake of water and dry matter simultaneously.

As a first step in designing new or improving existing watering systems, producers will need to determine animal

water requirements. These will depend on various factors – livestock species, age, moisture concentration of the feed, air temperature and humidity and distance animals must travel to the water sources. The table below provides estimates of the amount of water consumed during one day. Note that as temperature increases from 50 to 90 degrees Fahrenheit, livestock water needs approximately double.

The amount of moisture present in forage or feed affects water intake as well. An animal can gain 15 gallons a day from lush pasture growth, but this opportunity is restricted to cooler days only. During hot and dry periods, forage moisture concentration is low and animals' need to drink is increased. Other things to consider include:

- Dairy breeds have higher water needs than beef breeds.

- Mature cows need 3 to 5 pounds of water per pound of dry matter.
- Lactating females require more water than nonlactating females.
- Animals drink more water when it is readily available.

The quality of the water provided to livestock is critical to their health, and it is not ideal to let animals drink directly from surface water, including ponds and streams. Pathogens can easily contaminate surface runoff, which may also be a source of parasite infestation. Research supports the presumption that clean water has positive effects on animal performance. In a study in Alberta, Canada, scientists showed that steers provided with fresh water gained 2.6 pounds per day, whereas steers provided with pond water gained only 2.0 pounds per day. As

Livestock	Water needs per animal (50°F day)	Water needs per animal (90°F day)
Dry beef cows	8-12 gallons	20-30 gallons
Lactating beef cows	12-20 gallons	25-35 gallons
Lactating dairy cows	20-30 gallons	30-40 gallons
600-pound weaned calves	6-9 gallons	10-15 gallons
Horses	8-12 gallons	20-25 gallons
Sheep and goats	2-3 gallons	3-4 gallons

Source: NRCS



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Cooperative Extension Service

indicated in the *Animal Science E-News* October issue, providing cattle with access to ponds or streams is not the best choice from the perspective of environmental stewardship. Here are some further shortcomings of providing livestock unrestricted access to surface waters:

- Water contaminated with manure may develop blue-green algae, which can poison livestock, resulting in muscle tremors, liver damage and death.
- High nitrate levels interfere with the ability of animals to absorb oxygen.
- High salinity of water may cause dehydration.
- Bacteria present in stream and pond water can cause diseases such as leptospirosis and brucellosis.
- Sheep and goats seem to be more sensitive to foul water than cattle.

- Experience from producers has shown increases in weaning weights and average daily gain for stockers when provided with clean water.

In deciding which water sources may be appropriate, producers should choose several options if possible. Power outages, adverse weather conditions or equipment breakdowns can limit operability of these systems; thus, it is important to diversify. Backup water sources help reduce expenses and reduce problems. Of course, the development of water sources must be feasible and economically manageable for each particular farm.

To start the process of getting your delivery systems into shape, make a list of potential water sources on your site. Then decide if the quality from each site is acceptable, and estimate the quantity

each source can supply. You should also take into consideration that your watering source should be workable for the next five to ten years.

For water delivery from source to livestock, producers can essentially choose among pumps, gravity flow, hauling, tanks or access to surface waters. Producers need to check which supply may work best for their purposes. Again, access to surface waters without restriction is not encouraged, although there are many opportunities to alleviate negative environmental impacts.

Whether you decide to install new watering systems or to upgrade the old ones, your livestock will benefit. Stay tuned for more information regarding engineering and construction of watering systems in upcoming issues of *Animal Science E-News*.

Preventing Calf Scours Starts Now

Dr. Jeremy Powell, Associate Professor and Extension Veterinarian

According to USDA data, calf scours leads to approximately 15 percent of all calf mortality, making it a leading cause of calf deaths in the U.S. Calves suffering from scours can become critically ill in a short period of time. Scours can quickly lead to dehydration and electrolyte depletion, which could eventually cause the animal's death. It is important to remember when dealing with calf scours that the key is to prevent the disease from occurring in the first place. During the upcoming calving season, producers should keep in mind the importance of their calves getting an adequate amount of good quality colostrum that will aid in protecting them from calf scours.

Colostrum plays a vital role in the newborn's immunity status during the first few months of life. Colostrum is made up of essential nutrients for the newborn calf including energy, protein and antibodies. If the calf fails to receive the proper amount of colostrum, it will be more susceptible to pathogens such as calf scours. In order to ensure the calf receives defensive antibodies against calf scours from colostrum, the cow should be vaccinated well ahead of calving. To optimize a high level of antibodies against calf scours in the cow's colostrum, she should be vaccinated

approximately six weeks prior to calving. If a scours vaccine has never been used in a herd, then a booster dose may also be required.



Typically, a beef calf will ingest adequate colostrum on its own. However, if a calf is not nursing within two hours of birth, steps should be taken to tube feed colostrum to the calf. After being born, the average 80-pound beef calf should receive approximately two quarts of colostrum within the first six hours following birth and an additional two quarts within the next six hours. Factors such as calving difficulty, hypothermia or

prolonged calving time may impair a newborn's ability to nurse normally. If tube feeding is required, colostrum should be taken directly from the dam if possible. If an inadequate amount is available, injecting 1cc of oxytocin can increase "milk letdown." Otherwise, frozen or commercial colostrum may also be used.

To ensure the cow will produce good quality colostrum, the producer must ensure the cow gets adequate nutrition during her gestation period. The most important nutrient for the production of good quality colostrum is protein. Colostrum contains a very large amount of antibodies from the cow's immune system. These antibodies are made of protein. To produce good quality colostrum, protein is essential in the cow's diet. Depending on breed, a cow in late gestation should receive 1 1/2 to 2 pounds of protein per head per day to meet requirements. Cows of adequate body condition (BCS = 5.5-6.0) should normally produce good quality colostrum.

Several pathogens can lead to scours in calves. Generally, a calf scours vaccine will protect against four organisms that lead to scours: *E. coli*, rotavirus, coronavirus and *Clostridium perfringens*. The agent responsible for the disease is

usually determined by the calf's age as well as the integrity of the calf's defenses. To decrease the likelihood of a calf scours outbreak in the herd, a producer should:

- Maximize colostrum transfer.
- Optimize environmental sanitation.
- Reduce stressors such as overcrowding or poor nutrition.
- Vaccinate bred cows with calf scour vaccine six weeks before calving.

If calf scours becomes a problem in your herd, then focus your treatment efforts on correcting any fluid deficits, treating electrolyte imbalances, providing nutritional support and administering a broad spectrum antibiotic. If dehydration has occurred, oral or intravenous fluids may be used to correct this. Electrolyte powders can be added to oral solutions to correct electrolyte imbalances. Also, it is important to replace energy stores with oral or IV fluids containing glucose or dextrose supplements. Finally, a broad spectrum antibiotic should be administered for calf scours. It is important to

consult with your veterinarian for treatment advice if you have any issue with calf scours.

Another potential preventative for calf scours is the use of a rotational calving system. By rotating heavy springing cows into fresh calving pastures every week of the calving season and leaving behind those cows with newborn calves by side, you can segregate newborns by age, decreasing the likelihood for calf scours to be shared among the group. For more information about calf scours and other beef cattle management tips, contact your county Extension office.

River Valley Beef Cattle Conference Moved to I-40 Livestock Auction

Dr. Tom R. Troxel, Professor

The 2009 River Valley Beef Cattle and KOMA Conference is scheduled for February 10, 2009, at the I-40 Livestock Auction in Ozark, Arkansas. The program will begin at 9:30 a.m. with registration. There is a \$20 registration fee payable at the door. At 10 a.m., **Bob Rhodes**, county Extension agent - staff chair, and **Dr. Ivory Lyles**, associate vice president - Extension, will provide the welcome.

The theme for the program is "Producing Quality Calves." **Dr. Tom Troxel**, professor and associate department head - animal science, will discuss factors affecting the selling price of Arkansas calves.

Jim Loftin and Diane Hardgrave will use live calves to discuss and demonstrate the factors that influence the calf's market value. In addition, the audience will have an opportunity to evaluate each calf and compare their results with the "experts."

Jim Loftin is a lifelong resident of Cherokee County in East Central Oklahoma. For the last 25 years, Jim was an order buyer procuring stocker and feeder cattle for others. His customer base ranges from local cattlemen needing just one load per year to major feed yards. One feedlot and two large order-

buying outfits account for a large portion of the cattle he has bought since 1992. Jim also runs a sizable cattle operation himself. A herd of 300 commercial cows is maintained on leased pasture, with calves usually retained through harvest. In addition, 2,500 to 4,000 head of stocker calves are purchased and run through his receiving and growing yard annually before being sent to winter wheat or summer pasture on a gain basis. Upon reaching feeder weight, ownership is retained through finishing in a custom feed yard.

Diane Hardgrave is a livestock market reporter for the University of Arkansas Division of Agriculture. She reports the livestock sales in Fort Smith, Ratcliff, Ozark and Ola, Arkansas.

Following the live calf demonstrations, cows will be brought into the sale ring and evaluated by Kent Barnes and Bill Wallace. They will also discuss the type of bull needed to produce a desirable calf. As with the calf demonstration, audience members will be able to express their opinions.

Kent Barnes has worked for Oklahoma Cooperative Extension Service since 1975. His office is located in Muskogee, where he serves 21 counties in Northeast Oklahoma with the latest

research-based information in livestock management, nutrition and production. Kent was instrumental in starting the Oklahoma Steer Feedout. He works with producers searching for alternative markets for their cattle to increase profits. He organizes a cattle conference and trade show each year for producers in the state.

Bill Wallace is retired from the University of Arkansas Division of Agriculture, Cooperative Extension Service, where he served as a county agent and beef cattle specialist. As a specialist, Bill provided leadership for the cow herd performance program. He enrolled cattle and assisted with weighing, culling and making selection decisions for over 140 herds across the state. Since retirement, Bill continues to be active in the beef industry as a consultant and a beef producer.

Lunch will be served at noon, and the program will conclude around 1 p.m. This is a program cattle producers cannot miss. With the increasing cost of production, producing a quality calf that will bring top dollars is important for profitability.

This program is sponsored by Farm Credit Services of Western Arkansas. We'd also like to express our appreciation to **Kent Reading**, I-40 Livestock Auction, for hosting the event.

Matching Milk Production and Cow Size to Resources

Dr. Brett Barham, Assistant Professor

Cow weight is probably easier to wrap your mind around than milk production, but research has shown that cows with the genetic propensity to milk

heavily require more nutrients year round, not just when they are milking.

The National Research Council (NRC) data shows that a cow producing

25 pounds of milk at peak lactation requires 10 percent more feed energy than a cow producing 15 pounds of milk at peak lactation. To see a 10 percent

difference in feed energy with regard to mature weight, it would require moving from a 1,000-pound cow to a 1,200-pound cow, or a change of 200 pounds of body weight.

There are breed differences in lactation yields, so breed selection is critical in matching genetics to your environment. These breed differences can be found in literature from research at the Meat Animal Research Center (MARC). We know that selection for increased yearling weights has led to larger mature cows that are more expensive to maintain. Moderating mature cow size and selecting for an optimal window of milk production is beneficial when it comes to cutting costs regardless of your production environment.

Arkansas is not traditionally known as an area that has limited forage availability. However, with extremely high fertilizer prices and limitations on applying phosphorus to farms that fall within nutrient surplus zones, forage production levels may not be sustainable at the levels to which many have become

accustomed. In limited feed environments, females with high maintenance energy requirements may also have difficulty maintaining an acceptable body condition score and rebreeding. One study determined that with limited nutrient availability, breeds with a high genetic potential for milk production had longer anestrus periods, which lead to lower conception rates during a fixed breeding season. Other researchers have concluded that selection for increased milk production past an adequate threshold is not economically or biologically efficient.

Some breed associations have developed genetic selection tools to aid in decreasing cow costs. The American Angus Association has a Cow Energy Value Index (\$EN), which is measured in dollars of savings per head due to decreased energy requirements for maintenance (www.angus.org). In low-input environments, a high \$EN would be more desirable.

The Red Angus Association of America calculates a Maintenance Energy (ME) Expected Progeny

Difference (EPD) that indicates differences in the Mcal/month needed for maintenance due to mature size (corrected for body condition score) and milking ability (www.redangus.org). A much simpler way to think of it is that a bull with a ME EPD of +10 compared to one that is +0 will produce daughters that will require approximately 11 more pounds of average quality forage per month (assuming average quality forage = .86 Mcal per pound) to maintain its body condition.

Clearly, identifying your production environment and setting realistic production goals, given that environment, is critical. Profit lies in the optimization of expense and revenue, and optimization is always more challenging than maximizing outputs or minimizing inputs. It will require more effort, detailed financial records and a structured breeding objective that builds a cow herd based on optimum values and not extremes.

For more information on matching milk production and cow size to resources, contact your local county Extension office.

300-Day Grazing Demonstration

Dr. Tom R. Troxel, Professor

The Livestock and Forestry Branch Station at Batesville and the animal science faculty started a new project to apply research-based management practices to demonstrate 300 days of grazing. With input costs increasing and selling price decreasing, getting more utilization from the grazing program for cattle weight gains is very important.

Don Hubbell, station director; **Drs. Shane Gadberry, Brett Barham, John Jennings** and **Tom Troxel**; and **Kenny Simons** are working together to manage a cow-calf herd to reach 300 days of grazing. As the project moves along, updates on activities and results will be shared, including the budget. The project started on July 1, 2008, with 135 acres and 38 fall-calving cows. The 135 acres consist of 40 acres of common bermudagrass and 95 acres of cool-season forage. Of the cool-season forage, 23 acres are ArkPlus, 23 acres are of ryegrass/crabgrass pasture and 45 acres are KY31 fescue.

The goals are to 1) produce a 90 percent net calf crop, 2) average weaning weight of 550 pounds and 3) reduce the supplemental hay needs to 60 days or less. All costs associated with the cow herd will be counted in the budget to calculate return.

Pastures

- Forty acres of predominantly common bermudagrass divided into four 10-acre paddocks. Each paddock has a water source and is not conducive for hay production. The paddocks could be further divided into eight 5-acre paddocks. Possible management practices are 1) soil test the paddocks and 2) spray Roundup in February to March to kill cool-season forage.
- Ninety-five acres of predominantly fescue forage divided equally into four pastures: two paddocks of ArkPlus (42 acres per paddock) and two paddocks of Kentucky 31 (42 acres per paddock). One paddock of the ArkPlus contains an excellent

stand, while the other paddock contains an ArkPlus stand of about 50 percent. Each paddock has a pond and, with careful planning, could be divided. These pastures can be hayed if necessary.

Cow Herd

- The cow herd is predominately Brangus Balancer cross females.
- **Calving Season: September 1 to November 1.** Of the 38 cows, one cow was not pregnant and five calves died following birth. Therefore, the calf crop percentage is 84 percent. The six cows that either lost a calf or were not pregnant were sold, and cows with young calves were purchased for replacements.
- **Breeding Season: November 21 to January 26.** Two Hereford bulls were leased and fertility tested prior to the breeding season. One bull failed the BSE and was replaced with a fertile Hereford bull.

Intercollegiate Livestock Judging Team Completes Another Successful Year

Bryan Kutz, Instructor

The Livestock team began the year with a trip to Phoenix. Seven team members spent most of their holiday on the road. They toured the Grand Canyon, judged livestock in sunny Arizona and finished as the Reserve Champion team of the Arizona National. From there the team traveled to the Southwestern Exposition in Ft. Worth, Dixie National in Jackson, Mississippi, San Antonio Livestock Show and the Houston Livestock show and rodeo, where the team placed fifth, third, sixth and eighth,

respectively. The final contest of the spring semester was the All-East competition at the University of Kentucky. This contest consisted of three separate contests rewarding the overall combined scores. The U of A Judging team finished sixth in live evaluation, second in selection, third in livestock judging and third overall.

The 2008 fall semester started with the National Barrow Show in Austin, Minnesota, where they finished ninth. The team finished fourth at the

Mid-South Fair, sixth at Tulsa, first at the State Fair of Louisiana, twelfth at the American Royal and finished as the ninth best team out of 28 at the North American in Louisville, Kentucky.

Team members include Brooke Ross, Stillwell, Oklahoma; Jordan McDaniel, Van Buren, Arkansas; Jim Coffey, Prairie Grove, Arkansas; Joey Zamudio, Alfrida, Arizona; Taylor Gwin, Hampton, Arkansas; Mike Schultz, Coffeyville, Kansas; and Justin Green, Pleasant Plains, Arkansas.

Youth Beef Project Selection Tips

Steve Jones, Associate Professor

The 4-H Beef Project allows youth to practice and demonstrate what they learn at numerous supporting activities like fairs, judging contests, shows and educational bowls and presentation contests. These programs also help youth become aware of career opportunities in animal agricultural industries.

These projects teach:

- A. Responsible care and well-being of animals.
- B. Life skills, like decision making and communication skills, through judging events and oral presentations.
- C. Awareness of management practices in animal agriculture.
- D. The safe and appropriate use of animal products.
- E. Scientific principles.

It is important to have a plan and to set goals for the new project year before selecting the project(s). A few tips to keep in mind will help get the project year started on a good note.

1. Selection – Purchase animals that weigh 500 pounds (or more for steers) at seven months of age (weaning). Purchase from breeders who can tell you the sire, dam, date of birth and immunization history of their animals.

- **Breeding Animals (long-term project)**. Select for type, structural soundness, breed and sex characteristics. Use both pedigree and

performance data (if available) to assist in selection. Animals can be exhibited up to two years of age.

- **Commercial Heifers (short-term project)**. Selection is basically the same as for breeding animals with the exception that heifers are cross-bred animals. Heifers can be exhibited as long as baby teeth are intact.
- **Market Steers (short-term project)**. Select for type, muscling, finish, capacity, structural soundness, carcass merit, balance and style. Steers are castrated and dehorned at an early age and should grow out to 1,150-1,350 pounds and be 12-18 months old at show time.

2. Basic Equipment – Buckets, rope halter, clippers, scotch and curry combs, brush, scales (to keep track of weights) and show stick.

3. Shelter and Pen – House animals in a shelter that is draft-free in winter and cool in summer. Stalls should be at least 10' x 10'. Use sand, sawdust or straw for bedding. A lot 30' x 40' adjoining the shelter provides enough exercise space for one calf. Lot and shelter must be safely fenced and well drained.

4. Feeding – Be consistent in feeding. Give bulls and heifers an amount equal in weight to 2.5 percent of their body weights; allow half of this

amount in roughage. Protein requirements range from 12.5 percent for the 544-pound calf to 9.3 percent for the 1,600-pound mature bull. Feed steers 3 percent of body weight per day of a 12-14 percent protein ration. Mineral supplements and water should be available at all times.

5. Disease/Parasite Control –

Vaccinate (if not done by the breeder) for blackleg, malignant edema, IBR, PI3, leptospirosis and Pasteurella. Learn how to use chemicals that control grubs and lice; flies can be controlled by keeping stalls and lots clean. Control internal parasites with approved beef cattle dewormers. Follow manufacturer/veterinarian's directions when using medicines or chemicals. Vaccinate calf for shipping fever before transporting to show.

6. Fitting for Show – Fitting includes getting to know your animal as well as washing, clipping, trimming hooves and performing other tasks that allow exhibition of the animal at its best. The most important part of fitting is halter breaking.

7. Other Hints – Keep good records on your project and know everything about your animal (birthdate, weight, breed, tag numbers). Watch for signs of illness and disease. If you plan to exhibit, study the rules and regulations for the shows you wish to attend.

Practical Riding Applications

Steve Jones, Associate Professor

There are three general goals that should be on all horsemen's or horsewomen's agendas each time they ride. Safety for horse and rider is one. Improving or advancing your horsemanship skills is two. The third is improving the ability of the horse to perform to the rider's expectations. The accomplishment of goal three is the result of a good training plan, including creating an environment that allows the horse to be tested yet experience success. These goals apply to both the professional **and** recreational rider. The recreational rider especially needs to have a plan due to limited riding time. Each minute counts, so you don't need to waste time.

The more a horse is exposed to new and different sights, sounds, terrains and experiences, the more likely that horse becomes a relaxed, willing and cooperative partner. Anything that causes a horse or rider to feel uneasy and insecure can become an obstacle. A natural obstacle might be a tree down across a trail, a boulder head-high to a horse or even a small creek or ditch in the horse pasture. Man-made obstacles are everywhere! These include gates, bridges, roads, cars, ATVs, backpackers, bicyclists, etc. Any obstacle will become twice as large and hard to handle from the rider's perspective when a group of people wait for the rider to maneuver around, over or through the problem, particularly if they insist on giving advice. Instead of waiting to deal with obstacles in that stressful situation, it's far easier to prepare a horse at home. In a familiar environment, horse

and rider can learn to deal with troublesome situations in a controlled manner and at their own pace. This relaxed setting allows trust and confidence to grow between the pair, which serves them well when they later encounter the unexpected on the trail.

Granted, no rider can fully prepare his/her horse for every obstacle. But a rider can use every obstacle as an opportunity to build trust and confidence between himself/herself and the horse. A recreational rider can take the same approach at home. If the rider routinely sets up unfamiliar situations at home and successfully guides the horse through them, the horse soon comes to trust the rider to help deal with the unknown. The rider becomes confident and comes to rely on the mount to carry him/her safely past any potential hazard.

A horse can walk by an object in a pasture every day without a problem, but put a rider on his back and the horse spooks at the object every trip. What's the difference? The apparently unconcerned loose horse knows he can leave in a hurry should he feel the need – no bridle reins or halter rope confines him. But the horse with the rider might not feel so free to leave if the flight instinct takes over; he knows the rider can use the reins to keep him there. So the horse then becomes twice as frightened – the first time by what he fears might lurk behind the object and the second time by what he fears the rider might do to keep him from fleeing to safety.

A horseman can create various training obstacles and introduce the horse to them in a safe environment such as a round pen or arena. Plastic bags tied to the fence can simulate wind blown objects, and a wooden bridge made of a sheet of plywood or scrap lumber can simulate the real thing. You can create "step-overs" using elevated wood fence posts, landscape timbers or PVC pipe. A plastic tarp creates a good water crossing, especially if you spray water on it. To learn to ride between tight areas, use highway markers (cones), plastic buckets, plastic barrels or rubber feed tubs. Sack your horse out using a soft cotton rope or an old lariat and you can accustom him to the feel of vines, weeds or briars. The fun thing about this process is it is only limited by your imagination. If you look around your farm, you can create a good obstacle course without spending much money. Don't get so creative that you put yourself or the horse in danger! The object here is to train a horse to control his fear and to have confidence that the rider will not ask him to do something that will endanger his life.

It is possible to home-school your horse to face many hazards – natural or man-made. Home preparation allows the horse and rider to learn to cope with potential obstacles in safe, controlled lessons. The benefits include trust between the horse and rider and a safe riding experience.

Schedule of Events

Contact your local county agent for details.

Goat Conference (Conway) – January 31

Beef Cattle Quiz Bowl (State Fair Grounds) – February 7

River Valley Beef Cattle and KOMA Conference (Ozark) – February 10

4-H Horse Conference – March 7

Southwest Research and Extension Center Stocker Cattle Conference (Hope) – March 17

4-H Goat Conference (Washington County) – March 28

4-H Goat Conference (Pulaski County) – April 18

Livestock and Forestry Branch Station Field Day (Batesville) – April 21

Arkansas Forage and Grassland Tour (Booneville) – April 24

4-H Grassland Contest – April 29