SERIES: DROUGHT AND LIVESTOCK WATER
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Note to Educators: Much of the following material appeared in the last edition of Timely Topics. Some new material has been added, and the paper has been split into shorter stand-alone articles more suitable for newsletters or local newspaper columns. There are five articles. Feel free to recombine them or change the order as you see fit.

I. DROUGHT AND LIVESTOCK PONDS

Livestock ponds in most regions of the state remain well below optimum water levels. As the weather warms this spring and summer, cattle will wade in many of these ponds. Deposited manure and accompanying pathogens, ammonia and nutrients will concentrate in ponds which are low and not being flushed by normal spring rains. The intermediate rains we’ve had in some areas, one-half to one inch, make matters worse by washing accumulated waste and sediment off of overgrazed pastures into ponds.

The effect of these unwanted inputs to stagnant ponds is what we often call “water fouling.” Bacterial and algal growths, as well as high ammonia and sulfide concentrations in bottom mud, make the water so pungent that cattle may not drink enough to meet their daily needs if ponds are their only source.

A couple of livestock diseases are particularly associated with water fouling. Mastitis may spread through wading in fouled ponds. While dairymen regularly observe and test for mastitis, cow-calf producers may never notice it. However, it can affect daily gain in calves. Leptospirosis is a bacterial disease spread in the urine of infected animals. Cattle can acquire the infection from ponds where infected animals have been wading and urinating.

Of course, dehydration due to low water intake from fouled ponds can also be considered a disease, even when not accompanied by infection or toxicity.

Another problem that arises each summer in a few livestock ponds is algal toxicity. Under certain conditions, species of blue-green algae produce substances which are severely toxic to cattle and other animals. These situations are rare, but they usually occur during hot, dry weather in mid- to late summer in ponds with high inputs of nutrients, particularly phosphorus. Symptoms of blue-green algae toxicity include ataxia, convulsions, bloody diarrhea and sudden death. Blooms of blue-green algae can sometimes be recognized when gentle winds concentrate them near the surface along the downwind shore. They appear as a paint-like scum, usually green to bluish in color. It is best to observe ponds in the early morning when the sun is low, before very high winds occur. The appearance of a bloom does not necessarily mean the water is toxic, but shifting livestock to an alternate source of water is recommended. The presence of dead wildlife near a pond (small mammals, turtles, frogs, etc) should especially raise suspicions of a toxic bloom.
II. WHAT TO DO ABOUT LIVESTOCK PROBLEMS FROM FOULED PONDS

Recent drought conditions have left many livestock ponds low. Low ponds, warm weather and wading cattle combine to increase the risk of “water fouling”. This can cause cattle to consume less water than they need, reducing gain. Fouled water also has the potential to transmit bacterial diseases and promote toxic algae blooms.

When disease symptoms are present that have no ready explanation and a water problem is suspected, a veterinarian should be called for diagnostic help before sending water samples off for testing. There is no single test for all water quality problems, and random testing for toxic compounds is usually fruitless and very expensive.

If signs of a blue-green algae bloom are present, there is some risk of cattle toxicity. It is advisable to restrict cattle access to the pond, or at least block off their access to the downwind end, until conditions improve. Producers can submit a quart sample of pond water from the area of the bloom to the county OSU Extension Center for referral to the OSU Animal Disease Diagnostic Lab. The lab will determine only the presence of blue-green algae, not the toxicity of the water. The cost is $10. Copper-containing herbicides such as copper sulfate can help control blue-green algae and other types of algae. However, if not applied correctly, any herbicide can cause fish kills due to rapid decay of plants and depletion of oxygen in the water. Copper can be directly toxic to fish. Contact County Extension Agriculture Educators for advice on algae and aquatic weed control.

The best testing tools for water fouling are your nose and eyes. If the water smells and looks nasty, it very likely is not optimal for your livestock, and will probably cause inadequate water intake if it is the only source.

A general livestock water test is available from the OSU Soil, Water and Forage Analytical Lab for $6. Bring a pint sample to the county Extension office. The test covers pH, nitrates and total dissolved salts in the water. A pond that is low due to evaporation may have elevated levels of salts and - if the water is also fouled due to wading - high nitrates. The lab report will indicate if the water meets recommended livestock standards for the tested items.

If ponds are to remain the main source of water, the best long-term solution to water fouling is to permanently fence off the pond or at least restrict livestock access to a small area. In-filled ponds should be cleaned out to restore banks and storage capacity and then retrofitted with facilities to use the water away from the pond.

In the short term, water fouling raises the immediate need to look for alternate sources of livestock water.
III. ALTERNATE WATER SOURCES FOR LIVESTOCK

As ponds become low, water may become unacceptable for livestock use due to water fouling, which can compromise production and livestock health. Alternate water sources need to be considered. These can include:

- Using municipal or rural water systems
- Using an existing well or drilling a new one
- Pumping water from adjacent ponds or streams
- Hauling water

All of these options have advantages and drawbacks. Municipal or rural water is high in quality, but can be costly. A new tap fee may be required. Municipal water may entail an additional sewer fee, even though household sewage volume does not increase.

Water yield from an existing well should be evaluated carefully in comparison to livestock water demand. A herd of 30 cows could need upwards of 750 gallons per day in hot weather. If the well yield is marginal, nighttime pumping and extra storage capacity may be needed.

Drilling new wells can be a risky and expensive proposition, depending on the location. Judge the estimated cost of a well against the cost of 10 years of rural or municipal water bills or building a new pond. Experienced neighbors and local well drillers can assist in evaluating the likelihood of getting a good well. Information on groundwater, and a search of well drillers’ logs by county or legal description can be found online from the Oklahoma Water Resources Board at [http://www.owrb.state.ok.us/supply/index.php](http://www.owrb.state.ok.us/supply/index.php). Many records on this website appear incomplete, but it may be worth calling the OWRB to request more information on individual well records.

It may be possible to pump or siphon water from a nearby stream or pond that has good quality water. Gasoline, diesel and solar pumps are alternatives if access to electric power is unavailable. Again, setting up a reliable system will entail significant expense.

For the above options, be sure to consider adequate sizing and freeze-proofing of water troughs, as well as “cow-proofing” floats or other water level control devices. It is especially critical to plan for enough space around a trough, to avoid jostling, fighting and damage to facilities. A good general source of information is a short fact sheet from Clemson University Extension, Alternative Water Strategies for Livestock, by William R. (Rusty) Thomson, available online at [http://www.clemson.edu/laurens/local/water.pdf](http://www.clemson.edu/laurens/local/water.pdf).

Another useful publication is Pumping Water from Remote Locations, by Lori Marsh, Extension Engineer, Virginia Tech Publication Number 442-755, May 2001. It is available online at [http://www.ext.vt.edu/pubs/bse/442-755/442-755.html#L12](http://www.ext.vt.edu/pubs/bse/442-755/442-755.html#L12). This publication contains detailed information on required watering space, flow rates and reserve capacity needed for watering cattle. Also included are pump-sizing and piping tables, energy cost calculations, and details on alternative power sources such as solar and wind.
As for hauling water, that 750 gallons a day required for 30 cows in hot weather can add up to a daunting task which should be reserved only for emergencies. Thomson also reminds us to be careful about choosing tanks to haul livestock water. Tanks that have been used for fuel or chemicals should especially be avoided.

IV. INCREASING THE WATER STORAGE EFFICIENCY OF YOUR POND

The recent drought is causing many producers to consider the storage capacity of their livestock ponds. Building more ponds is an option, but there are some things that can be done in the medium and long term to increase the water available from existing ponds. Many of the following ideas come from Ken Williams, of Langston University. They are also available on the website, [http://www.lurexext.edu/aquaculture/new%20pond%20management.htm](http://www.lurexext.edu/aquaculture/new%20pond%20management.htm).

- Deepen shallow areas while ponds are low. Consider a total cleanout if the pond can be emptied.

- Fence off renovated ponds to restrict cattle access. Unrestricted access and wading leads to shoreline erosion, in-filling and loss of storage.

- Manage the watershed to reduce sedimentation and in-filling. Maintain good cover on pasture; divert or buffer runoff from heavy livestock use areas and plowed fields.

- If sediment from the watershed cannot be controlled by owner management, consider constructing a sediment retention basin above the main pond. Contact NRCS for design information.

- Avoid and repair leaks: Trap out muskrats or other burrowing animals. Treat any small leaks early, to prevent much greater expense and water loss as leaks enlarge. The website cited above has advice on leak repair.

- Do not permit trees to grow on or near pond dams. Trees transpire large amounts of water in hot weather. Moreover, trees on pond dams often cause leakage due to roots creating channels in the soil. Small trees growing on dams can be removed. However large trees over a foot in diameter should probably be left in place, since allowing their roots to decay will speed the creation of leaks.

- Consider increasing the catchment area contributing to a pond. This can be done by creating small berms angling gently upslope and away from the pond dam, to intercept runoff that would otherwise bypass the dam. This practice should be discussed with the Natural Resources Conservation Service (NRCS) first, as there is a risk of exceeding the design capacity of the pond. Berms can be created with a single-bottom plow, throwing soil downslope from a six-inch furrow. Re-establish grass cover quickly on exposed soil.

- Plant windbreaks across path of prevailing summer winds to reduce pond evaporation. Locate trees well away from pond levees to avoid root-induced leakage.
V. A LONG-TERM LOOK AT YOUR LIVESTOCK PONDS

Do you think of a pond as a routine expense for a water source, or rather as a capital investment in your farm or ranch? If you add a pond and its water management system to the farm’s cost basis, you can certainly deduct it from your capital gain when you sell the property. With this in mind, wouldn’t it pay to do it right and maximize both the life of the investment and its contribution to your property value?

Most ranchers are well aware of cattle impacts on pond banks: bare, compacted soil, deeply incised trails, dam slopes caving in at water’s edge, and muddy, manure-laden bogs in the flat areas. Until the dry weather hits, they may be less aware that all of that destabilized soil has simply gone to fill in the pond and reduce its storage capacity. The recent drought has been an eye-opener for many, as they look at the shallow, fouled water and realize how the capacity of their ponds has declined over the years. Improved pond management not only provides better water for livestock over a longer period, it can also turn an eyesore into a pleasing, high-value part of the landscape, with additional recreational opportunities.

Many ponds have been cleaned out over the winter, and some new ones have been built. To maximize a pond’s productive life and enhancement of property value, the first priority should be to restrict or eliminate open cattle access to the water. Planning for this should ideally begin before construction.

First, for new ponds, always consult with the county Natural Resources Conservation Service (NRCS) office. They can help locate the best site, lay out the pond, evaluate soils for water tightness and design dams and piping systems that will promote maximum useful life and quality stock water at a reasonable cost. Don’t be tempted to cut corners on the advice of the neighbor with the ‘dozer down the road. NRCS publishes an excellent 95-page booklet, Ponds - Planning, Design, Construction. It is available free at most NRCS offices or can be downloaded at: http://landcare.sc.egov.usda.gov/product.asp?ID=115.

There is generally no good reason to build a new livestock pond without through-the-dam piping. Water can be gravity-fed to a remote trough or to a freeze-proof tank in the outside toe of the dam. Such systems enable the complete, permanent fencing of the pond and a reliable supply of uncontaminated water. The small added expense for plumbing and troughs will pay off manyfold in extended pond life, livestock health and never having to chop ice!

Existing ponds

Cutting through an existing dam to install piping can be somewhat risky. Compromised dam cores will need to be restored and anti-seep collars installed around pipes to prevent leakage. On the other hand, if trees have been allowed to grow on the dam or leakage is occurring, this would be a good excuse to re-build the dam and install piping. Again, refer to NRCS for advice.

An alternative for otherwise adequate ponds is the use of fencing to restrict cattle access to all but a limited area of the pond. This involves less expense but usually more maintenance.
One method involves using a solar-powered electric fence mounted on floating 2” PVC pipes surrounding the water access point. The advantage of this system is that it moves up and down with pond water levels. Instructions are available from County Extension offices.\(^1\) Limited access can also be achieved using livestock paneling and T-posts to surround the watering area, but these may have to be moved as water levels fluctuate. Either way, water access points need to be of adequate size to prevent excessive jostling among cattle. These areas should also be reinforced well into the pond with geo-textile mat fabric covered by crushed rock, to prevent cattle from bogging down in mud.\(^2\) Similar reinforcement is recommended for any heavy-use water access area, including around water troughs.


**Consider stocking your pond!**

Whatever choices you make to improve pond management and water quality, don’t forget the opportunities you open up for multiple uses - swimming, fishing and wildlife. For example, the Oklahoma Department of Wildlife Conservation (ODWC) will provide fish at no charge for stocking ponds that are certified free of existing fish populations. You will not be required to open up fishing to the public. For information call your local Game Warden or contact the ODWC Fisheries Division at (405) 521-3721. Your grandkids will appreciate it.

\(^1\) The fact sheet, “Constructing a Floating Electric Fence for Stock Watering Ponds”, by Marley Beem is available from the author in the OSU Forestry Dept. or from Mitch Fram.

\(^2\) Geotextile fabric is available from the Delaware Conservation District for $1.25/sq.yd.