

The Mississippi Mister: A More Affordable Way to Cool Pasture Animals



When a cow's environment gets above 68 THI (temperature humidity index), milk production levels can decrease by as much as 25 percent. Heat-stressed cows have decreased fertility rates because the increase in body temperature negatively influences ovarian function and reduces oocyte health and embryonic development. Mississippi State University's Bearden Dairy Research Center is home to a grazing herd where a center pivot has been used since 2015. Since the pivot installation, drought risk on the associated pastures has been reduced, and a more controlled grazing season is possible. With the addition of PVC mister attachments on the center pivot, we are able to cool the cows. With cows being cooled under the sprayers of the center pivot, heat stress may be less likely to negatively affect production and reproduction.

Please see MSU Extension Publication 3122 *Dairy Production and Center-Pivot Irrigation Systems* for more information on the uses and economics of center pivots. In this publication, we present a less expensive option to get the heat abatement power of a center pivot. The authors designed and built this device, called the "Mississippi Mister," for a research project and found it useful enough to put on dairy farms looking for viable heat abatement options beyond a center pivot.

Supplies Needed

The following supplies, all of which should be available at local home improvement stores or co-ops, are needed to build one mister:

- (6) 10-foot-2-inch sch. 40 PVC pipes
- (7) 2-inch sch. 40, 90 degree elbows
- (7) 2-inch sch. 40 tees
- (3) 2-inch sch. 40 cross (4-way)
- 2-inch (slip) x 1½-inch (threaded) PVC bushing
- 1½-inch clean-out plug
- ½-inch male x ¾-inch female swivel hose connector
- ¾-inch hose connector shut-off valve
- ½-inch sch. 40 PVC tee (threaded on all three sides)
- ½-inch x 36-inch PVC risers
- PVC sch. 40, 2-inch (slip) x ¾-inch (threaded) bushing
- (2) adjustable-pattern shrub sprinkler nozzles, ½-inch inlet, up to 15-foot spacing
- Roll of Teflon tape (thread tape)
- Zip ties
- PVC cleaner and glue

Some cutting is required if purchasing the size PVC pipes listed above. Smaller pipes are available but are more expensive, so it will save money to cut them yourself. Cut pipes into the following pieces:

- (10) 2-foot pieces
- (4) 1-foot pieces
- (3) 3-foot pieces
- (2) 2½-foot pieces
- (2) 5-foot pieces
- Cut one 10-foot pipe into (1) 6-foot piece, (1) 3-foot piece, and (1) 1-foot piece

Cost of Installation

The approximate annual fixed and operating cost per acre is \$212.44 for a center-pivot irrigation system. Please see MSU Extension Publication 3122 *Dairy Production and Center-Pivot Irrigation Systems* for more information on the cost breakdown.

The Mississippi Mister incurs a one-time cost of approximately \$130, and any additional annual costs would come from repairs and water usage. Four to six adult lactating cows can comfortably use one mister, so, depending on herd size, a producer might need to build multiple misters. However, using this mister in conjunction with portable shade is a viable option to provide more shade and more options for cattle.

Downsides

- Two primary advantages of a center pivot system that the Mississippi Mister lacks are 1) the ability to irrigate a field to increase forage quality and quantity; and 2) the flexibility to switch to other production systems as practices and market forces change (i.e., irrigation for crop or beef fields if the producer exits the dairy industry).
- Depending on herd size, a producer might need to build multiple misters. These could be used in certain areas or in conjunction with portable shade to accommodate more cows.
- Treat these misters the same as a portable shade structure, moving them every few days to ensure the ground beneath the mister does not turn muddy, which can breed mastitis pathogens and create dirty cows. A hose needs to run from a water source out to the mister, so this may not be an option if the pasture is too far from water.

Conclusion

For approximately half of the year, Mississippi's dairy cattle experience heat stress conditions. When dairy cattle are heat-stressed, their production levels and fertility rates drop. The center pivot irrigation system is an alternative to help increase production and improve reproduction during hot weather, but it requires a large upfront cost

that many producers may not be able or willing to invest. The Mississippi Mister is an inexpensive, viable alternative that can be built on the farm as time permits. It may be particularly useful when used in conjunction with portable shade. In addition, these misters may be a worthwhile trial route for producers who are contemplating investing in a center pivot.



Figure 1. Mississippi Mister with PVC fittings labeled.

- 1/2" sch. 40 PVC tee, threaded on all three sides
- Zip ties
- Adjustable pattern shrub sprinkler nozzles, 1/2" inlet, up to 15' spacing
- 1/2" x 36" PVC riser
- 1/2" (male) x 3/4" (female) swivel hose connector
- 3/4" hose connector shut-off valve
- 2" (slip) x 1 1/2" (threaded) PVC bushing
- 1 1/2" clean-out plug



Figure 2. Mississippi Mister with PVC fittings and other materials labeled.

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