



Using the Mesonet Cattle Comfort Advisor

INTRODUCTION

Comfortable cattle are productive cattle. Comfortable cattle gain better and maintain a higher level of health. The Mesonet Cattle Comfort Advisor estimates cattle comfort levels based on data from the Oklahoma Mesonet and National Weather Service forecasts. The Mesonet Cattle Comfort Advisor runs continuously monitoring heat or cold stress on a year-round basis.

Stress levels are calculated using a new stress formula developed by animal scientists affiliated with the University of Nebraska. Additional weather variables have been added into this new cattle stress index, compared to traditional heat and cold stress models. Sunlight adds to heat stress, while in cold situations it decreases cold stress. In the traditional wind chill model, wind increases cold stress. That stays the same, while in heat situations wind is a new factor that decreases heat stress. In the old heat stress index, relative humidity increased heat stress. In the new Cattle Comfort Advisor, relative humidity is still a factor in increasing heat stress and is also included as a factor that increases cold stress.

Forecast products for the Mesonet Cattle Comfort Advisor are based on the National Weather Service's 84-hour North American Mesoscale Model (NAM). The NAM forecast is updated every six hours.

What do the Numbers Mean?

The Cattle Comfort category ranges in the following table are for healthy animals that have developed a hair coat appropriate for the season and are receiving feed and nutrient amounts sufficient for the level of exposure.

Moisture from rainfall or from melting snow or ice that wets the animal's coat down to the skin can dramatically drop the category ranges. Wet coat values have not been established for the new Mesonet Cattle Comfort Advisor, although including relative humidity as a weather variable in cold stress conditions provides some measure of increased cold stress in wet, cold weather. (The previous Mesonet Cattle Stress Index calculated lower critical temperatures for a wet animal coat, based on research done in Iowa using the traditional wind chill formula.)

Young or non-acclimated animal cold stress levels should be adjusted up by 25°F. For example, the Cattle Comfort Cold Danger value for a young calf, unhealthy animal, or newly arriving cattle from a warmer climate should be raised from -20°F to 5°F.

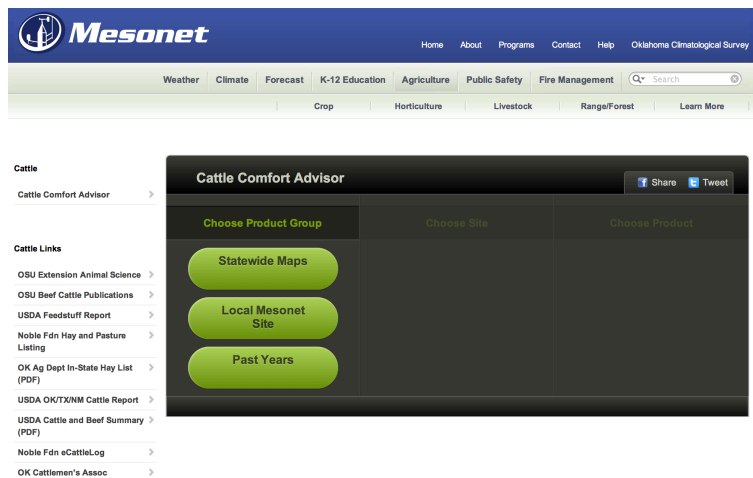
Mesonet Cattle Comfort Index values are reported as degrees Fahrenheit. The values do not represent exact temperatures. They do represent the approximate hot and cold levels an animal is being exposed to and is dealing with physiologically.

Heat and cold stress level categories for the Mesonet Cattle Comfort Advisor are:

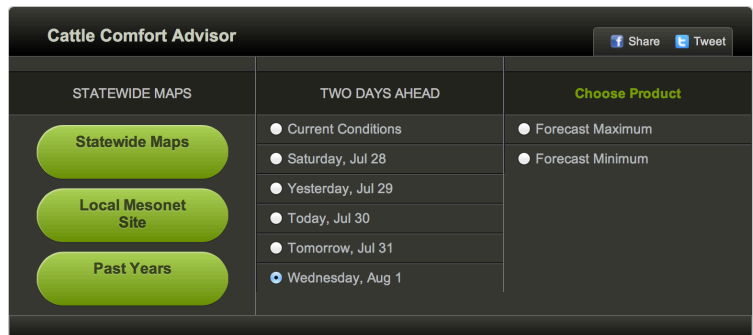
Mesonet Cattle Comfort Categories	Cattle Comfort Index °F	Impacts
Heat Danger	>105	Animal deaths may exceed 5%
Heat Caution	>85 to 105	Decreased production, 20% or more. Reduced conception, as low as 0%
Comfortable	15 to 85	
Cold Caution	<15 to -20	18-36% increase in dry animal feed
Cold Danger	<-20	

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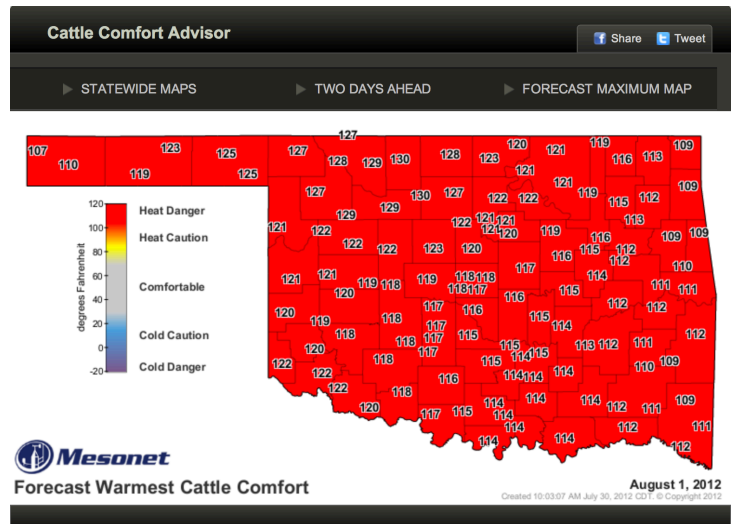
To get to the Mesonet Cattle Comfort Advisor go to the Mesonet.org website and click on “Agriculture” in the top main menu. A quick link is included under “Agriculture Essentials” menu choices or select “Livestock,” then “Cattle,” then “Cattle Comfort Advisor.” Display products are grouped into “Statewide Maps,” “Local Mesonet Site,” or “Past Years.” Local Mesonet Site and Past Years display products include both graphs and tables.



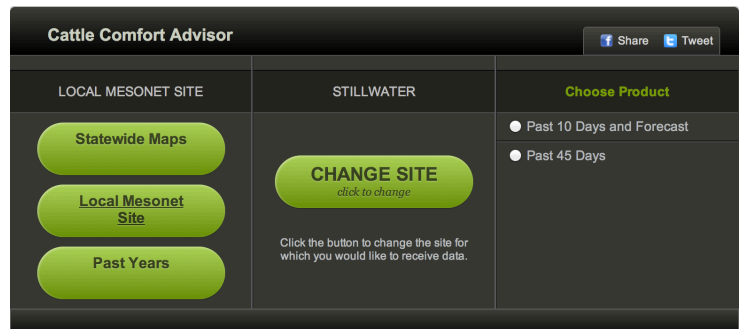
Statewide Maps choices include current, past and forecast Oklahoma maps. The “Current Conditions” map is updated every five minutes. There are maps of maximum and minimum, cattle comfort for the past two days. Forecast maximums and minimums are available for the current day and two days into the future.



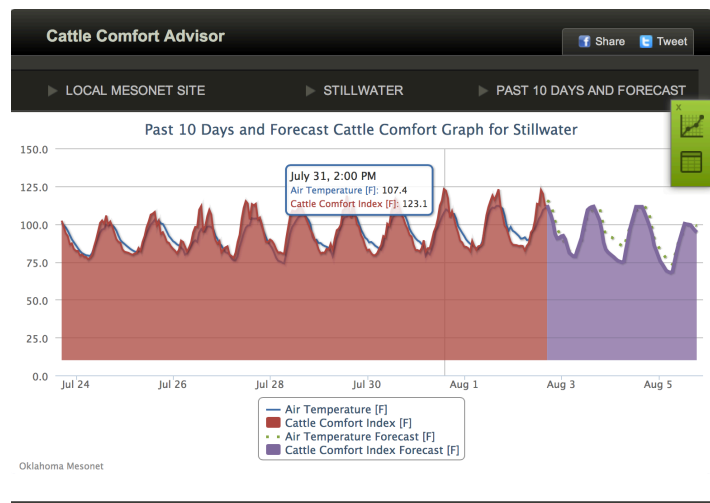
The forecast maps provide a way to quickly see areas of the state that will experience extreme conditions. Past maps can be saved or printed for reference.



“Local Mesonet Site” graphs provide a time series for a single Mesonet location. Graphs and tables show cattle comfort for the “Past 10 Days and Forecast” or “Past 45 Days.” Forecast cattle comfort is based on the 84-hour National Weather Service North American Mesoscale Model.



Selecting “Past 10 Days and Forecast” loads a graph of cattle comfort and air temperatures. The red color, filled series shows past cattle comfort index values in one-hour increments. The blue, solid line shows past Mesonet air temperatures. The purple, filled graph area shows the forecast cattle comfort index. The gray-green, dotted line is the forecast air temperature.



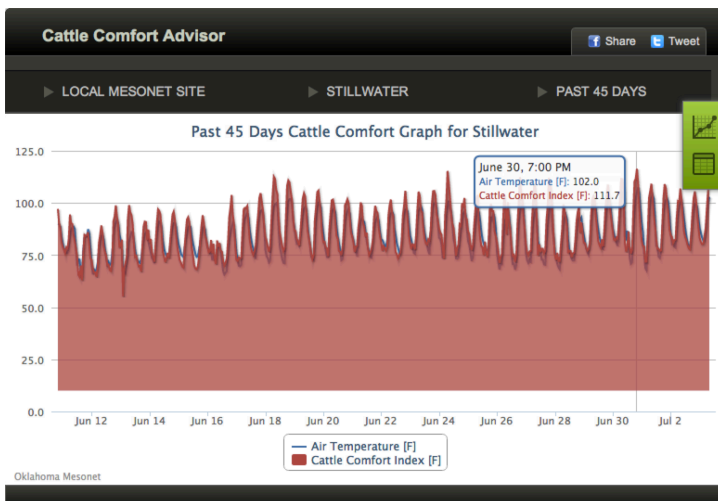
To zoom the graph into a shorter time period, move the mouse to the start time you want, left click and drag to the desired end time, then release the left mouse button. To reset the zoom view, click “Reset zoom” box that appears on the right side of the graph in zoom mode.

To switch to a table of cattle comfort index values move your mouse to the right side of the graph and when the green box appears, click the “table” icon in the green box. The table variables included are: cattle comfort index, air temperature, relative humidity, wind speed, solar radiation, and corrections for: relative humidity, wind speed, and solar radiation.

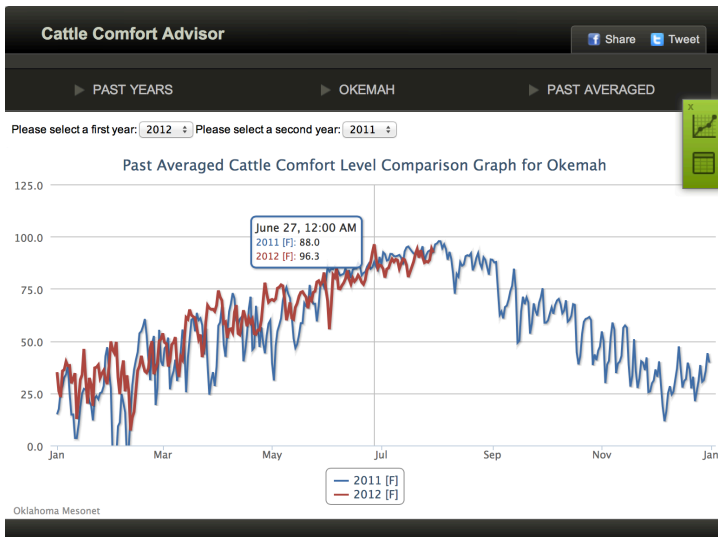
At the bottom of the table you can choose table tools to navigate data pages, show more data rows per page, refresh the table, print the table, or filter table data shown.

Date and Time	Comfort Category	Comfort Degrees [F] *	Air Temperature [F] *	Relative Humidity [%]	Wind Speed [mph]*	Sunlight [W/m*2]	Humidity Correction [F] *
2012-08-01 1:00 AM	Comfortable	84.9	89.8	29.1	6	0	-0.2
2012-08-01 2:00 AM	Comfortable	84	88.2	31	5.6	0	0.2
2012-08-01 3:00 AM	Comfortable	82	86.9	34.3	6.3	0	0.7
2012-08-01 4:00 AM	Heat Warning	88.9	86	36.8	2.2	0	1.1
2012-08-01 5:00 AM	Heat Warning	85.5	84.9	41.1	3.8	0	1.8
2012-08-01 6:00 AM	Comfortable	82.9	84	43.6	4.7	0	2
2012-08-01 7:00 AM	Heat Warning	85.3	83.5	46	3.6	15.3	2.3
2012-08-01 8:00 AM	Heat Warning	85.6	85.3	44.8	5.8	147	2.3
2012-08-01 9:00 AM	Heat Warning	87.1	88.5	40.8	7.2	151.6	1.8
2012-08-01 10:00 AM	Heat Warning	96.8	95.5	29.8	11	590.1	0
2012-08-01 11:00 AM	Heat Danger	105.8	100.2	24.5	8.3	763	-1.3
2012-08-01 12:00 PM	Heat Danger	111.2	105.8	18.2	9.6	892.4	-3.2
2012-08-01 1:00 PM	Heat Danger	115.3	109.2	14.1	8.5	936.4	-4.7
2012-08-01 2:00 PM	Heat Danger	118.9	110.8	13.3	6.7	948.7	-5
2012-08-01 3:00 PM	Heat Danger	116.1	110.5	13.6	8.3	871.3	-4.9
2012-08-01 4:00 PM	Heat Danger	119.3	111.9	12.7	5.4	779.8	-5.4
2012-08-01 5:00 PM	Heat Danger	122.9	111.9	12.5	2.7	619.1	-5.4
2012-08-01 6:00 PM	Heat Danger	112.1	111.2	12.6	6	426.3	-5.2
2012-08-01 7:00 PM	Heat Danger	106	110.1	14.1	7.6	224.7	-4.7

The “Past 45 Days” cattle comfort graph shows data in 2-hour intervals for the past 45 days. There is no forecast data. Click on the table icon in the right green box to view the data in a table format.



“Past Years” graph and table products show average cattle comfort over a calendar year. Years back to 2008 can be selected for viewing and comparison. The table includes daily maximum and minimums.



HANDLING HEAT

Heat stress can reduce productivity in beef cattle herds. Severe heat stress can reduce reproductive performance and/or daily weight gain. Cattle are more sensitive to heat stress than humans. With the Mesonet Cattle Comfort Advisor heat stress is a combination of air temperature, relative humidity, solar radiation and wind speed. Animal age, hair coat length, hair coat color, and nutritional status interact with environmental factors to impact severity of heat stress on individual animals.

Provide ample water:

The most important management concern in heat stress situations is to provide ample water. Cattle will drink more water when the water is cleaner and cooler. Provide enough tanks for cattle to be able to get the water they need. If possible, water should be cooled. Tanks should be cleaned weekly to encourage water consumption. Making water available under shade will increase water consumption.

On days when the cattle comfort index reaches 85°F or higher, cattle commonly need 2 gallons of water per 100 pounds of body weight.

Avoid handling cattle:

Handling cattle can elevate their body temperature by as much as 3.5°F. If cattle must be worked on days when the Cattle Comfort Index is likely to go over 85°F, try to do the work before 8:00 AM and keep the maximum time in the holding facilities to 30 minutes or less. On days when the index will be 85°F or above, do not work cattle after 10:00 AM.

Change feeding patterns:

For fed cattle, shift the feeding schedule toward evening on days when the Cattle Comfort Index is above 85°F. Try to deliver 70% of the daily scheduled feed two to four hours after the peak Cattle Comfort Index value. Small amounts of feed during the heat of the day, keeps metabolic heat of digestion low.

Provide shade:

A shade tree is just as welcome a relief for cattle as humans on a hot summer day. Shade can also be constructed. Shade height should be 8-14 feet tall and should be large enough to provide 20-40 square feet per animal. The most effective shade is a solid reflective roof constructed of white colored, galvanized, or aluminum materials. Shading with wooden slats, plastic fencing, or other materials that allow flecks of sunlight to hit the animals are less effective. If possible two shaded areas are recommended, one over the feed area to increase feeding time, and another away from the feed area to encourage the cattle to rest. Water should be made available under both shaded areas, to increase the water consumption during heat stress period. If the structure is left up year-round, construct a frame adequate for snow load. Shade is insurance against mortality loss. Any performance benefits are a bonus.

Improve airflow:

Consider where the cattle are located and if there is any air restriction. Buildings, high fences, or vegetation can block airflow. A 6-foot high windbreak can obstruct airflow for 60 feet downwind.

Control biting flies:

Stable flies cause cattle to bunch and disrupt cooling. Monitor the situation and control the flies as needed. Eliminate any shallow pools or muddy areas nearby, since they are common breeding areas for flies.

Wetting animals:

In emergency heat stress situations, it may be necessary to cool cattle by soaking them with water. A sprinkler or water nozzle needs to have enough pressure and water volume to wet the animal to the skin. Mists that only wet an animal's outer hair coat may actually increase heat stress by increasing the nearby relative humidity. Local fire departments may be able and willing to soak cattle down in an extreme emergency situation.

COPING WITH COLD

Beef cattle can be comfortable within a wide range of temperatures, depending largely on hair coat length and hair coat condition (dry, wet, muddy etc.). The Mesonet Cattle Comfort Advisor provides a tool that livestock producers can use to monitor cold stress conditions over time. Research indicates that the effects of cold, wind, wet hair coat, and muddy pastures and pens are additive. These stresses can be managed to a limited degree.

In general, a cow's energy requirements increase 1% for each degree the cattle comfort index is below 32°F. For a cow wet to the skin, the increased energy requirement begins at 59°F and increases 2% for each degree drop.

In cold wet conditions, this increased energy need is often virtually impossible to accomplish with feedstuffs available on ranches. In addition, this amount of energy change in the diet of cows accustomed to a high roughage diet, must be made very gradually to avoid severe digestive disorders. Therefore, the more common-sense approach is a smaller increase in energy fed during wet cold weather and extending the increase into more pleasant weather to help regain energy lost during the storm.

For example, a cow consuming 16 pounds of grass hay per day and 5 pounds of 20% range cubes under mild weather, could have its feed increased to 20 pounds of grass hay per day (also possibly offering a better quality hay) plus 6 to 7 pounds of range cubes during a severe weather event. This is not a doubling of the energy intake but extending this amount for a day or two after a storm may help overcome the energy loss during the storm and is done in a manner that does not cause digestive disorders.

A second approach that is often used is to reserve the highest quality hay for feeding during stressful weather periods.

References:

- T.L. Mader, L.J. Johnson, and J.B. Gaughan. A comprehensive index for assessing environmental stress in animals. *Journal of Animal Science* 2010, 88(6):2153-2165. Erratum, *Journal of Animal Science* 2011, 89(9):2955.
- *Managing Feedlot Heat Stress, Nebraska Extension NebGuide, G1409, Revised September 2007.*

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