

FEEDLOT HEAT STRESS CHECKLIST

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Understand that cattle are more sensitive to heat than humans. Cattle have an upper critical temperature (UCT) approximately 20 degrees F. lower than humans UCT. When humans are uncomfortable at 80 degrees F and feel hot at 90 F, cattle may be close to death. Humidity is an additional key element heat tolerance.

Start by developing a plan. To the extent possible, anticipate the crisis so you can get maximum benefit from your plan. Think about the history or previous heat stress problems in your area and be ready. Wet years (high potential humidity) and long-term weather forecast of hotter than normal conditions should signal early activation of a heat stress management plan. Activate this plan when temperatures combined with humidity are forecast to be in the critical range for livestock. The first calm wind day can be lethal to cattle.

Look for the clues to an impending heat stress crisis:

First Clue: Predicted hot weather following precipitation. It is the combined temperature and humidity that determines the severity of heat stress. Days in the high 80's degree F following a precipitation event can be deadly, especially if the wind become calm.

Second Clue: Monitor the upper critical temperature-humidity limits of cattle. Consider this limit has been reached when the Temperature-Humidity Index reaches 80 (see the THI chart included).

Third Clue: Evening weather forecast for overnight temperatures to remain above 70 degrees F. A potential heat stress crisis situation exists for cattle when there is little or no night cooling. Looks out for days following nights in which the ambient temperature did not drop below 70 degrees F. Feedlot losses have been commonly reported when consecutive days with Temperature-Humidity Index values above 80 have been tied together with nights in which the temperature stayed above 70 degrees F.

DEVELOPING A HEAT STRESS MANAGEMENT PLAN.

Below are listed some ideas for your plan. The first items listed are more easily accomplished and may significantly improve the performance of cattle during times of heat stress. They should always be done when the possibility exists of heat stress reaching the upper critical limits of cattle.

Have ample water available.

When temperatures reach 80 degrees, cattle need two to three gallons of water pre 100 pounds of body weight. Put out extra watering tanks if needed. Providing at least three inches of linear space pre animal can be lifesaving in feedyards. As well as lifesaving, having ample linear space for cattle to drink and stay cool can be important in maintaining cattle. Add additional water tank space until cattle have access to at least five gallons pre hour and best if ten gallons per hour. Keeping waterers clean should encourage water consumption. Weekly scheduled waterer cleaning also improves the likelihood of finding malfunctioning waterer.

Avoid handling cattle if possible.

If cattle must be handled, work them from midnight to 8 "AM. Do not work cattle after 10 am. While it may seem to make sense to work cattle after sun down, wait until the cattle have had at least six hour of night cooling before working. This optimizes the calf's innate diurnal rhythms in regard to heat accumulation and dissipation allowing the calf to deal more effectively with heat stress during the day. Work with the packers to schedule shipping cattle at night. Try to start loading after 1AM such that all cattle can arrive before 7AM. All packers have sprinklers and can keep the cattle comfortable. If cattle arrive with body temperature elevated above what would normally be expected carcass defects such as dark cutters may be more common.

Cattle that must be handled during the day should spend no more than 30 minutes in the handling facility (processing or hospital area), i.e. only put 30 minutes worth of cattle in the tub, snake, etc. Avoiding cattle bunching is equally important. Most cattle working facilities have very poor wind movement. Cattle will gain heat each minute they are in these areas. A 30-minute time limit minimizes the heat gain and allows the body core temperature to return to normal quicker, so the calf can deal successfully with heat stress. Arrange to have sprinklers in those areas. Tubing (one-half to three-fourth inch) equipped with spray nozzles (one misting nozzle per five animals) placed overhead will improve the cooling in handling and holding areas.

Change your feeding patterns and consider backing up the energy.

Shifting the feeding schedule toward evening deliveries may help hold cattle on feed and even out the consumption patterns. Delivering 70 percent or more of the days scheduled feed two to four hours after the peak ambient temperature of the day has been reached may decrease the roller coaster intake patterns often observed. Moving to a late day feeding schedule may also minimize the sub-clinical acidosis that is thought to contribute to the problems seen in time of heat stress. Lowering the energy level has been controversial but research indicates backing the energy down a few NeG points (five to seven percent decrease) may lower the heat load on the cattle.

The following items may be more difficult to accomplish, requiring more intense prior planning, labor and materials to implement. The key is to know where your potential problem areas are and focus your efforts on critical areas first.

Assess water supply and delivery capacity. At the peak of the day the system needs to deliver 1.1% of body weight per hour. This can be calculated from line diameter and line pressure. These calculations should always be preformed before installing new watering systems. Check the flow rates on automatic water tanks in existing facilities to insure they can provide enough water for all the cattle in the pen in at least one hour. The gallons per minute a waterer can deliver can be estimated by using a rubber tube to divert from the waterer-input orifice (controlled by the float) into a bucket. Divert the water for 15 seconds and estimate the gallons that would have been delivered per minute. If deficiencies are identified in total supply or delivery at peak demand periods, additional supply and/or waterers must be added when temperatures are in the critical range. OR, the cattle should be spread out to more pens so that the existing water supply can better serve the critical needs of the cattle.

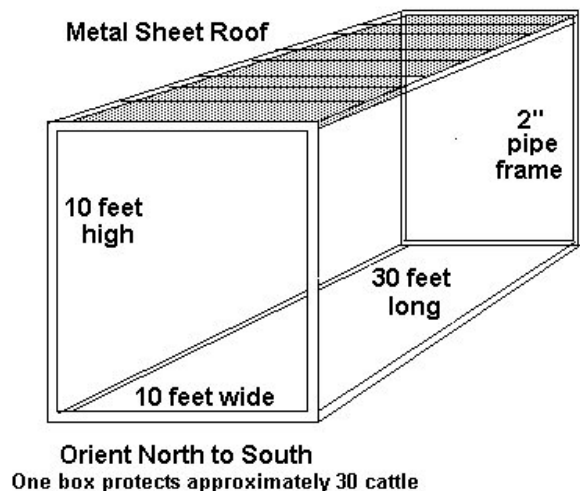
Make arrangements for emergency water. Contact the local fire department or cooperative to access equipment that can deliver emergency water. Make sure livestock drinking water is safe and palatable. Large volume sprinklers are being installed some feed yards. Sprinklers can effectively keep cattle below their upper critical temperature by increasing evaporative cooling and lowering ground temperature. Coverage of six to ten square feet per head should be adequate.

Move cattle away from wind breaks. Wind breaks maybe great in the winter; they can be deadly in the summer. Identify wind dead spots in the feedlot and give these areas special attention. If possible, you may consider abandoning these pens during critical heat stress.

Improve airflow in pens. Identify heavy, finished cattle and newly arrived high-risk cattle in the feedlot and give these pens special attention in regard to airflow. Cut weeds, tall brush and tall plants 150 feet back from the perimeter of the pens. If possible, you may consider moving these cattle to shaded pens or pens with better wind flow. Consider building tall earth mounds. Tall earth mounds can allow cattle to move to the airflow. If building tall mounds is not possible move the cattle, but remember to handle all cattle between midnight and 8 AM. Never handle, work or move susceptible cattle during heat stress conditions after 10 AM.

Provide shade. Six to ten feet of shade per animal can be very protective, but it is expensive and can be high maintenance. Shade designs will influence the expense and maintenance. One of the more novel designs I have seen was a 10foot by 10foot by 30foot box with metal siding on the top (see diagram). The feedyard used three to four shade boxes per pen. When laid on their sides provided wind breaks in the winter. If you provide shade it should have a north-south orientation. This will allow complete drying under the shade during the day.

Control biting flies. Stable flies cause cattle to bunch and disrupt animal cooling. Removing weeds and brush within 150 feet of pens and spraying the shaded areas of building with a residual insecticide will help control stable flies.



Temperature Humidity Index (THI)

Relative Humidity

		30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%
T	100°	84	85	86	87	88	90	91	92	93	94	95	97
E	98°	83	84	85	86	87	88	89	90	91	93	94	95
M	96°	81	82	83	85	86	87	88	89	90	91	92	93
P	94°	80	81	82	83	84	85	86	87	88	89	90	91
E	92°	79	80	81	82	83	84	85	85	86	87	88	89
R	90°	78	79	79	80	81	82	83	84	85	86	86	87
A	88°	76	77	78	79	80	81	81	82	83	84	85	86
T	86°	75	76	77	78	78	79	80	81	81	82	83	84
U	84°	74	75	75	76	77	78	78	79	80	80	81	82
R	82°	73	73	74	75	75	76	77	77	78	79	79	80
E	80°	72	72	73	73	74	75	75	76	76	77	78	78
	78°	70	71	71	72	73	73	74	74	75	75	76	76
	76°	69	70	70	71	71	72	72	73	73	74	72	75

$$THI = T_{dbf} - (0.55 - (0.55 \times (RH / 100))) \times (T_{dbf} - 58)$$

Normal <74

Alert 75-78

Danger 79-83

Emergency >84

Review:

Post the THI table and evaluate the weather forecast against the THI table every evening.

Start emergency measures on days following no night cooling (temperatures stay above 70).

Schedule cattle handling between midnight and 8 AM. Never handle after 10 AM.

Insure cattle have adequate water and watering space (3 linear inches/head is recommended).

Evaluate water flow-rate and place extra waterers in each pen if needed.

Improve airflow and abandon or fix all wind dead spot areas in the feedlot.

Place shades (north – south orientation) in problem pens and consider providing in all pens.

Place sprinklers in problem pens and consider installing in all pens.

Shift daily feed delivery schedule toward evening feeding.

Reformulate ration to lower the energy content by five to seven percent.

HUMAN SAFETY

Maintaining feedlot personnel health during a heat crisis is critical. Without optimum output from personnel, the checklist items can't be accomplished. These recommendations are for personnel doing reasonably strenuous outdoor work when temperatures are in the critical range.

Alternate between hard and light work. If personnel must do hard work, spend 10-20 minutes of each hour doing less strenuous work, preferably in the shade.

Force water consumption. Drink one to two quarts of water per hour.

Use a "buddy system". Buddies should encourage each other to drink water, make sure the buddy alternates strenuous work with periods of light work, and watch for early signs of heat exhaustion. The first signs of heat exhaustion include mood changes, emotional responses, and confusion.

If heat exhaustion occurs, the person should not return to strenuous work that day. They should be assigned to office work or take the rest of the day off. Failure to do this may result in the person developing heat stroke, which is a medical emergency.

What are the signs of these heat disorders?

SUNBURN: Redness and pain. In severe cases swelling of skin, blisters, fever, headaches. Ointments for mild cases if blisters appear and do not break. If breaking occurs, apply dry sterile dressing. Serious, extensive cases should be seen by physician.

HEAT CRAMPS: Painful spasms usually in muscles of legs and abdomen possible. Heavy sweating. Firm pressure on cramping muscles, or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue use.

HEAT EXHAUSTION: Heavy sweating, weakness, skin cold, pale, and clammy. Pulse thready. Normal temperature possible. Fainting and vomiting. Get victim out of sun. Lay down and loosen clothing. Apply cool, wet cloths. Fan or move victim to air conditioned room. Sips of water. If nausea occurs, discontinue use. If vomiting continues, seek immediate medical attention.

HEAT STROKE or SUN STROKE: High body temperature (106 degrees F or higher). Hot dry skin. Rapid and strong pulse. Possible unconsciousness. **HEAT STROKE IS A SEVERE MEDICAL EMERGENCY SUMMON EMERGENCY MEDICAL ASSISTANCE OR GET THE VICTIM TO A HOSPITAL IMMEDIATELY. DELAY CAN BE FATAL.** Move the victim to a cooler environment. Reduce body temperature with cold bath or sponging. Use extreme caution. Remove clothing, use fans and air conditioners. If temperature rises again, repeat process. Do not give fluids.

Effects of humidity on apparent temperatures

RELATIVE HUMIDITY	Air temperature (degrees Fahrenheit)										
	70	75	80	85	90	95	100	105	110	115	120
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	130
30%	67	73	78	84	90	96	104	113	123	135	148
40%	68	74	79	86	93	101	110	123	137	151	
50%	69	75	81	88	96	107	120	135	150		
60%	70	76	82	90	100	114	132	149			
70%	70	77	85	93	106	124	144				
80%	71	78	86	97	113	136					
90%	71	79	88	102	122						
100%	72	80	91	108							

DANGER ZONE