Managing Heat Stress in Feedlot Cattle
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CONDITIONS LEADING TO HEAT STRESS:

Heat stress occurs when the combined temperature and humidity index exceed the upper end of cattle’s thermal neutral zone, the range where no additional energy is required to maintain thermoregulation. As the temperature-humidity index increases, cattle are at greater risk of heat stress (Figure 1). Additional factors that impact the likelihood of heat stress in feedlot cattle are wind speed and solar radiation.

As a general rule of thumb, cattle are at moderate risk for heat stress when temperatures exceed 80°F and high risk when temperatures exceed 90°F.

Cattle heat load is cumulative, meaning that cattle are at increased risk during longer duration of warm weather and when nighttime temperatures remain high (>70°F).

Figure 1. Livestock weather hazard guide, temperature-humidity index

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Adapted from The Samuel Roberts Noble Foundation, Inc. http://www.noble.org/ag/livestock/monitorheatstress

SIGNS OF HEAT STRESS:

- General agitation
- Bunching behavior
- Shade seeking
- Increased respiration rate
- Panting
- Open mouthed breathing
- Slobbering
RISK FOR HEAT STRESS:
- Heavy cattle
- Dark hided cattle
- Immune compromised cattle

IMPACTS OF HEAT STRESS:
- Decreased feed intake
- Reduced daily gain
- Extreme cases – fatality

MANAGING HEAT STRESS:
Unfortunately, complete elimination of heat stress is not possible, as such strategies that minimize the impacts of high heat and humidity weather events on cattle health and performance are necessary.

Following short and long term weather forecasts allows for the appropriate implementation of the heat stress abatement strategies discussed below. The majority of management strategies require advanced planning and implementation. The Cattle Heat Stress Forecast, offered by the USDA Agriculture Research Service, is a valuable tool that can be accessed at http://tinyurl.com/HeatStressForecast.

Water requirements
Providing sufficient quantities of clean water is paramount during periods of heat stress. Cattle can consume in excess of 20 gallons of water per day under heat stress. Water requirements are often referred to in linear inches of drinking space per animal; however, water refill time is just as important. Water flow rate should be rapid enough to ensure that waterer refill time will accommodate increased water consumption. Ideally, refill time should be rapid enough to provide the amount of water required for an entire 24-hour period within four hours.

Short term heat stress abatement strategies

_Cattle handling_ – if cattle must be handled during periods of high heat and humidity, processing should be confined to the early morning hours. Minimizing the time cattle spend in holding pens, utilizing holding pens that offer shade and moving cattle slowly will help reduce heat stress. Handling cattle late in the evening and overnight should be avoided because it prevents cattle from being able to dissipate the heat accumulated during the day, leading to greater risk of heat stress complications during the heat of the following day.

_Feed delivery_ – for cattle fed two or more times per day, offering 70% of the daily feed delivery after peak daytime temperatures can help decrease the severity of heat stress events. This strategy decreases the amount of time cattle are actively eating and moving about the pen during the heat of the day and shifts the peak of heat produced by the fermentation of feed to a cooler part of the day.
Long term heat stress abatement strategies

**Sprinklers** – sprinklers have been used successfully at the U of M Rosemount Research Feedlot to minimize cattle discomfort during high heat and humidity events. Sprinklers assist in heat stress abatement by decreasing both animal body temperature and feedlot surface temperature. Periodic use of sprinklers, rather than constant use, will maximize their cooling effect. The duration of sprinkler interval use is dependent on environmental conditions, with the goal being to thoroughly wet cattle in a relatively short duration of time and then allow cattle to dry completely before initiating another round of sprinkler use. Sprinklers producing a large droplet pattern are preferred, as smaller droplets or mist tend to coat the hair rather than wet the skin, which is necessary for evaporative cooling.

Sprinklers are best used early in the morning or overnight to help cattle cool down completely before the peak of daytime heat occurs. A wide spray pattern or multiple sprinklers per pen are ideal to prevent cattle bunching together. Cattle should be acclimated to use of the sprinklers over several days before a heat event.

Use of sprinklers is not appropriate in all systems. Sprinkler use will increase humidity, which as discussed previously is a component of heat stress, therefore care must be taken to ensure sprinklers are only used in areas with rapid air turnover. The increase in humidity associated with the use of sprinklers in pens with dead air may offset any advantage in evaporative cooling gained.

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**Shade** – provision of shade decreases core body temperature and respiration rate of cattle through a reduction of solar radiation, the energy emitted by the sun. The impact of shade on animal performance has been inconsistent and likely due to individual animal’s ability to acclimate to heat stress, duration and frequency of heat stress events and effectiveness of shade provision.

Twenty to 40 square feet of shaded area per head is recommended, as improvements in animal comfort due to shade are offset by overcrowding. The height of the shade structure influences airflow, with a minimum of seven feet in height recommended and careful assessment of placement to avoid wind obstruction from other structures or trees. Structures need to be capable of withstanding stresses from wind and snow burdens.

Recouping construction and maintenance costs of shade installations throughout the entire feedyard through enhanced performance may be challenging; however, selective installation in sick pens or pens designated for cattle at high risk of heat stress may be beneficial.
**Air flow** - careful consideration should be given to air flow when designing new confinement feedlot facilities. Steps to improve air flow when renovating existing facilities include opening ridgeline vents or installing positive pressure tubes.

Airflow through open feedlots should also be evaluated. For each foot of vertical windbreak, airflow will be obstructed for 10 feet downwind. Both winter and summer prevailing winds should be taken into consideration when planning windbreaks. Pens with areas of limited air movement can exacerbate heat stress. Ideally, these pens would not be utilized during summer months; however, since this is often not feasible, a reasonable strategy would be to avoid stocking pens with poor air flow with cattle that are at high risk of heat stress complications (black hided, heavy cattle and health-impacted animals).

**ADDITIONAL RESOURCES:**


