Stress Management in Dairy Cattle

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Atmospheric temperature and the heat produced internally from basal nutrient metabolism are the two sources of heat stress, which can have an impact on milk production. As milk production and feed intake increases, more heat from nutrient metabolism is produced, thus aggravating any heat stress incurred from environmental sources. As a result, higher producing cows will experience more heat stress than lower producing or dry cows.

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Dairy cattle have a normal body temperature of 101.3-102.8°F (rectal). The Thermo neutral Zone (TNZ) for cows is an environmental temperature range of 41-77°F. Within this temperature zone, the heat produced by normal metabolic function is approximately equal to the heat lost by the body. Humidity plays a significant role in heat stress. A temper ature of 100° F and 20 percent humidity is the range in which serious measures have to be taken to reduce the stress condition. Some type of cooling should be started. Threat occurs as the tempera ture nears 100° F and 50 percent humidity. The lethal range for cattle is 100° F and 80 percent humidity Producers need to watch the cattle as well as the environment and be familiar with the signs of heat stress. This includes;

- Restlessness and crowding under shade or at water tanks.
- Open-mouthed breathing (panting), and increased salivation
- Increased respiration rates (Moderate heat stress: 80 to 120 breaths per minute, Strong

Heat stress: 120 to 160 breaths per minute, Severe heat stress: over 160). · Gasping and lethargic.

- Dry matter intake starts to drop (8-12%) and milk production losses of 20-30%
- Conception rate will be poor due to less activity during estrus, reduced follicular activity and early embryonic death.
- Heat stress can contribute to lameness, perhaps due to acidosis or increased output of Bicarbonate.

Housing Management

The basic principle a farmer should keep in mind while constructing cattle shed is the method to reduce heat gain and promote heat loss by radiation and conduction during summer

Major considerations for cattle shed design are: orientation, space, height, and roof construction. The preferred **orientation** is east west. This is recommended because higher percentage of the shadow lies under the shade structure than when north-south orientation is used. .

As far as possible the reduction in heat liberation inside the building can be achieved by keeping the **density** of animals in the pen optimum. The shade structure should provide approximately 50-60 sq. ft. of floor space per milking animal in conventional system of housing, which is widely practiced in kerala. Shade height should be in the range of 7 to 14 ft, keeping in mind that the higher the shade, the greater the air movement.

Various types of **roofing materials** can be used for shade structures. The most effective in terms of

reducing heat load is a reflective roof such as aluminum, which has a reflectivity of 85 percent. The recommended eave height is 12 ft. for structures up to 40 ft. wide and 16 ft. for structures wider than 40 ft. Without proper ventilation in buildings and shaded areas, heat and moisture accumulate and the animals will be under stress. Although shading does not decrease air temperature, reducing radiant energy (sun exposure) to cattle is critical.

Fog, Mist and Sprinkling systems are some type of enrichments that can be fitted inside the sheds to mitigate the thermal stress on Animals. High-pressure **foggers** disperse a very fine water droplet, which quickly evaporates and cools air while raising the RH. As fog droplets are emitted they are immediately dispersed into the fan's air stream where they soon evaporate. A ring of fog nozzle is attached to exhaust side of fan. Cooled air is blown over animal's body. Foggers should operate during daylight hours since humidity is too high at night. They use less water /cow/day but require maintenance because water filters must be checked daily and cleaned. Fog systems are very efficient methods of cooling air but are more expensive than mist systems and require more maintenance.

Misters are another addition that can reduce heat stress. A **mist** droplet is larger than a fog droplet and animals are cooled primarily by inspiration of cooled air. There are several items to be considered while installing them. In warm humid environments, mist droplets are too large to fully evaporate before settling to the ground, and bedding or feed become wet. If a misting system does not wet the hair coat through to the skin, an insulating layer of air can be trapped between the skin and the layer of water. This will impede evaporative heat loss and can cause a harmful heat buildup. Cooling studies involving mist systems also reported respiratory and pneumonia problems when cows were exposed to mist particles in enclosed areas.

In confined cattle housing situations, **sprinklers** can have a multifold benefit. Initially, they are quite useful in keeping down the dust. Sprinkling helps to reduce body temperatures by increasing evaporative cooling. It can also help to reduce ground temperature as well. Studies have shown that cattle under sprinklers gain faster with increased feed efficiency. Sprinkling should take place intermittently over the course of the day to prevent a high humidity situation. Sprinkling 2 to 3 minutes followed by a break of 20 to 30 minutes seems to be ideal.

Planting trees near the sheds can provide external shade. Landscaping around the sheds with grass, shrubs or bushes can reduce ground reflection. Flies cause cows to pile up or gather in one closely compacted group and contribute to heat stress. Most important step in fly control is sanitation and cleanliness of stalls.

Feeding Management

Cattle will automatically reduce their feed intake during hot weather. Typically, cows in early lactation are severely affected. Decreased forage intake alters the composition of the rumen and leads to acidosis and reduced fat content of milk. Forage generates more heat than a grain ration, thereby contributing to reduced intake. One way to correct this problem is to feed **with high quality forage** during the summer, thus requiring fewer intakes to maintain a balanced ration. Never reduce the fiber level below 18 percent to 19 percent ADF and 25 percent to 28 percent NDF. When cow reduces their intake during heat stress, more nutrients need to be packed into a smaller volume of feed because cow's energy requirement for lactation is unchanged. Therefore, maintaining adequate nutrient intake becomes critical to avoid reduction in milk production.

The producer's primary feeding goal is to maintain intake and limit the negative effect of heat stress on milk production. During hot, humid weather, it is advisable to increase the **number of feedings per day.** Increasing the number enables one to feed less at any one time, thereby avoiding heating. Additional feeding also allow the producer to observe cattle more often to see how they are being affected by the heat and humidity.

The feed generates heat in the animal a few hours after intake. If the cow can generate and then dissipate the heat during the coolest hours of the day, then she can eat more. If we are feeding in the morning, the animal must handle the peak metabolic heat load along with the peak climatic heat load. So it is better to adopt a **70 percent evening,** 30 percent morning feeding schedule during the hotest part of the year.

Cows need to **increase water** intake during times

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