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How to Reduce Heat Stress in Dairy Cattle

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Four ways to reduce heat stress and maintain production and fertility in dairy cattle.

Heat stress is one of the leading causes of decreased production and fertility in Nebraska dairy cattle during summer months. These losses are apparent in the decreased amount of milk shipped, increased days open and decreased breedings per conception. Some heat stress is unavoidable, but effects can be minimized if certain management practices are followed.

Symptoms of Heat Stress

The ideal temperature range for dairy cattle is between 25°F and 65°F. Once the temperature goes above 80°F, cattle reduce feed intake, which has a negative impact on production. At 90°F or above, there usually is a dramatic decrease in milk production ranging from 3 percent to 20 percent.

Humidity also plays a significant part in heat stress. There are three temperature-humidity ranges of concern. A temperature of 100°F and 20 percent humidity is the range in which serious measures are begun to ease the stress on the cattle. Some type of cooling should be started. The danger occurs as the temperature nears 100°F and 50 percent humidity. The lethal range for cattle is 100°F and 80 percent humidity.

Since cattle sweat at only 10 percent of the human rate, they are more susceptible to heat stress. This is the reason dairy cattle need mechanical means to reduce heat, such as body sprinkling to aid in evaporation and effective air movement systems to aid in cooling. Stale, stagnant air can reach dangerous or lethal areas in a short time. Therefore, it is essential to have rapid movement of air in any confined area. During times of heat stress feed intake is reduce by 8 percent to 12 percent or more. This reduction in feed intake reduces volatile fatty acid production in the rumen, resulting in decreased production.

Heat Stress and Ration Balancing

Cattle automatically will reduce their feed intake during hot weather. Typically, early lactation cows are most swiftly and severely affected. This 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 high quality forage during the summer, thus requiring less intake to maintain a balanced ration. Never, however, reduce the fiber level below 18 percent to 19 percent ADF and 25 percent to 28 percent NDF.

If cows reduce their intake during heat stress, more nutrients need to be packed into a smaller volume of feed. Remember that a cow's energy requirement for lactation is unchanged and her energy needs to remain cool actually increase. Therefore, maintaining adequate nutrient intake becomes critical to avoid undue milk production loss. The following example illustrates the need for ration reformulation when feed intake declines by 20 percent:

	Daily dry matter intake	
Nutrient	50 lb	40 lb
Crude protein, %	16	19
Net energy (lactation) Mcal/lb	.73	.83

Optional methods to increase dietary nutrient density include feeding high quality forage, feeding more grain and use of supplemental fats. The NebGuide *Supplemental Fat for High Producing Dairy Cows* explains how to best feed different types of fat. To obtain a copy, go to *www.nebraskadairy.unl.edu* and look under Dairy NebGuides and UNL Extension Publications. Total dietary fat should not exceed 7 percent. The inclusion of a buffer to the ration often can help alleviate some of the milk fat depression and maintain feed intake.

Minerals also are more easily depleted during hot summer months. The increase in respiration and perspiration will cause an excessive loss of water, thereby reducing mineral

levels. Potassium can be increased to 1.3 percent to 1.5 percent of the total dietary dry matter, sodium to 0.5 percent and magnesium levels increased to 0.3 percent. If less forage is consumed and the forage is high in quality, the cow's rumination activity may decrease. Consequently, the proper use of buffers becomes important to maintain intake, ruminal pH and milk production.

The producer's primary feeding goal should be 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 feeding times per day. Increasing the number enables one to feed less at any one time, thereby avoiding feed heating and spoilage in the bunk. Flies around the feed also are reduced, thereby reducing the insect population. Additional feedings also allow the producer to observe cattle more often to see how they are being affected by the heat and humidity. Increasing the amount of feed available during the cooler period of the day such as early morning or late evening, may be another alternative. Feeding 60 percent to 70 percent of the ration between 8 p.m. and 8 a.m. has successfully increased milk production during hot weather.

Before drastically changing the ration during the hot summer months, be sure to consult a feed consultant or extension personnel. Remember, cattle are under extreme stress during this period and any drastic change could be counterproductive.

Reducing the Temperature

There are many ways to decrease the apparent effects of heat on dairy cattle. One important point to consider is increasing the amount of available water. Recommendations are for one waterer per 20 head. This may not be enough during extreme heat stress. When the temperature reaches danger levels, add additional sources of water near the feeding area. Another way to increase water consumption is to make certain water is cool. In one experiment cattle increased their water consumption when the water was at 50°F rather than 82°F. However, the value of extra milk produced must offset the cost of cooling the water. Never let water become stagnant. Be certain to routinely clean out waterers daily. Remember, cows will congregate where it is cool, so if the goal is to maximize intake, it makes sense to keep feed and water available in cooled areas.

Increasing air flow is another important component. Be certain air moves freely in all sections of the barn. There are two main ways to increase air flow. One is to install fans so air movement is increased and the second is to open the sides of the barn. In many cases walls of the barn may be made partially of concrete. In this situation, opening the lower level of the barn to increase air flow is not an option. The addition of fans is essential. In barns where sheet metal is used for the walls it may be practical to remove the sides and install netting over these areas. The netting can be raised to increase air flow during the summer and lowered during the winter. Increasing the roof venting is another option. For additional information on altering structures to reduce heat stress, please order the following publication: *Dairy Housing and Equipment Handbook, Midwest Planning Service-7*; from Biological Systems Engineering, University of Nebraska–Lincoln, Lincoln, NE 68583-0726.

If cattle are outside during the summer, provide shade for them so they can get out of direct sunlight during peak hours. Trees, if available, are excellent, but if no natural shade is available, constructing a netted area is a good alternative. Providing shade over the feeding area also will increase feed intake.

Misters are another addition that can reduce heat stress. There are several items to consider when installing them. Be certain misters are over a clean, preferably concreted, area, so animals do not lay down on mud or other areas, causing an increase in mastitis. Do not leave misters on continuously so udders drip with water. Put them on a timer and observe cattle — if water is dripping from the udder, then reduce the time misters are on. If misters are placed near the feed bunk, be certain the feed does not become wet — wet feed will mold faster during hot weather.

University of Nebraska research was conducted to study the feeding frequency of cattle from 8 a.m. to 8 p.m. with and without supplemental cooling. Results showed cattle shaded and cooled by sprinklers near the feed bunks ate between 63 percent to 100 percent of the time as compared to uncooled cattle. Therefore, offering a cool, shaded area for feeding during daylight hours will increase feed intake, helping to maintain production.

When hot weather sets in, be prepared to:

1. Modify the diet to maintain feed intake.
2. Increase the amount of water available to the herd.
3. Provide shade.
4. Provide for a good air exchange in the barn and install misters to help cool the cattle.

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