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## **Managing to Prevent Heat Stress in Dairy Cows During Hot Dry Weather**

**P.H. Robinson  
Cooperative Extension Specialist  
University of California, Davis, CA 95616-8521**

Hot weather during the summer is a predictable factor that must be dealt with on most California dairy ranches. Long summer days with high temperatures between 90F and 115F under cloudless blue skies are not the best conditions for lactating dairy cows, although they are far from the worst. However the reductions in animal performance that are often associated with these conditions can be minimized with appropriate animal and dietary management systems.

The purpose of this article is to briefly outline current information relative to managing dairy cows in ways that will prevent heat stress in dairy cows during hot dry weather.

### **Preventing Heat Stress**

Heat stress occurs when the combination of environmental temperature, relative humidity, solar radiation and air movement cause the temperature of the cow to exceed its zone of thermoneutrality. The best way to deal with heat stress is to prevent it from occurring. The objective of the management tools described below are to prevent heat stress from occurring so that dry matter intake (DMI) is not reduced and animal productivity is not compromised. There are several management tools to minimize the degree to which cows will feel the heat and thus maintain DMI.

#### *Shades*

The effect of shades on performance of dairy cows in drylots has been examined in some controlled research studies. Available results consistently demonstrate increased DMI and milk production from cows provided with shades in the loafing area. Data from Florida has also demonstrated that cows provided with shades in the loafing area are less hot (i.e., their body temperatures are lower) and that they feel less hot (i.e., their respiration rate is lower). These shades should be oriented in a North/South direction for most areas of California, provide about 40 to 45 square feet of shade per cow, and be about 12 to 13 feet high. There should be a raised dirt mound under the shades to

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prevent accumulation of moisture, and it should be groomed regularly. There are few controlled studies that have examined the impact of shades over feed and water bunks on performance of dairy cows. However, data from Florida showed that when cows were provided with feed and water under shade that they were less hot (i.e., their body temperatures were lower) and that they felt less hot (i.e., their respiration rates were lower). Shaded cows also produced more milk and had fewer services per conception than unshaded cows. Most studies on shade have used solid roof structures although shade cloths, such as woven polypropylene, provide about 80 to 85% as much shading and are considerably less expensive.

### *Misters*

While summer daytime temperatures in California are hot, they are not hot and humid. This means that there is an opportunity to make use of the animals' evaporative cooling capacity as a means of preventing them from feeling the heat. Research studies to evaluate the impact of misters in drylots, and/or on the bunkline, have consistently demonstrated increased milk yield even though DMI may or may not be influenced. In one study, in which water consumption was measured, the use of misters reduced water intake of the misted cows versus the unmisted controls. This was probably because the misted cows were not as hot and so transpired, sweated, less water than the unmisted controls. Misters under the shades in the loafing area should be used in conjunction with fans, at 8 to 9 feet above grade and oriented down at about 30 degrees, so that the water is blown onto the cows. The objective of misters is not to cool the air, but to put water on the cows where its evaporation provides the cooling. Bunk line misters should be oriented over the cows, and water volumes must be low enough to prevent slick conditions at the bunks. Bunk line misters are seldom required at night.

Cows in freestalls should be provided with bunk line misters with fans. Misters with fans have also been used successfully over the stall area. Cooling systems for cows in freestalls are less well understood than cooling systems for cows in drylots. However be sure that there is a roof peak opening and that the sides of the building can be opened to provide a free flow of air through the covered area.

### *Cooled Water*

While not practical on all dairy ranches, the use of cooled water has been examined in some research studies. In one study, it was found that cows preferred water at 80F versus water at 50F. However when cows were offered only 50F or 80F water, those provided with the cooler water drank more, as well as consuming more DM and producing more milk. Cows consuming the cooler water also felt less hot (i.e., their respiration rate was lower) even though they were not actually hotter (i.e., their body temperatures were the same). Similar results were recorded in another study.

### *Fans*

The use of fans, particularly in areas of poor ventilation, is generally considered beneficial in preventing cows from becoming hot. Fans are best used in conjunction

with misters, and their use was discussed above. However one particularly critical housing area is the crowd pen prior to the milking parlor. Heat stress can occur here at relatively low environmental temperatures due to crowding. This area should have sufficient fans and misters to assure an air turnover of up to 1000 cubic feet per minute per cow. The air should be driven away from the parlor to prevent milkers from turning them off during night milking, when lower environmental temperatures can give the illusion that overheating of the cows is unlikely. There should also be an opening in the roof line peak to allow hot air to escape.

### *Parlor Exit*

Cows should have access to fresh water at the parlor exit even if water is available in the pens. In addition, cow activated showers as the cows walk back to their pens, have been effective at reducing heat stress. Only deliver enough water to wet the cow.

Benefits of these cooling technologies will occur in all classes of cows, and will be seen in higher milk production as well as better reproductive performance and a lower disease incidence. In general, paybacks will be higher for mature cows, vs. heifers, and will be greatest for high producing cows. However, some information suggests that dry cows may benefit to a substantial degree from cooling due to fewer calving problems and higher milk production after calving.

### **Use of BST**

The use of BST in hot weather conditions has been examined extensively at several sites around the world. In general, results suggest that BST does not increase the extent of heat stress or make cows more prone to heat stress. Performance enhancements to BST used on cows in hot conditions do not appear substantively different from those recorded in cows that are not maintained under high environmental temperatures.

### **Summary**

Hot summertime temperatures are a fact of life for dairy ranchers in most areas of California. The best strategy for dairy ranchers is to employ management tools to prevent the hot temperatures from causing heat stress in their cows. Utilization of a combination of the tools discussed in this article can prevent heat stress from occurring in all but the most extreme weather conditions. Ration reformulation options to deal with the reduced feed intake that occurs when cows are heat stressed are discussed in a followup article.

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P.H. Robinson is a Cooperative Extension Specialist responsible for dairy cattle nutrition and nutritional management. He can be reached at: (530) 754-7565(voice) or (530) 752-0172(fax) or [phrobinson@ucdavis.edu](mailto:phrobinson@ucdavis.edu)(office) or [lovenbu@pacbell.net](mailto:lovenbu@pacbell.net)(home).