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Effects of sunshades on temperature and cow comfort

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Abstract
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Keywords
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EFFECTS OF SUNSHADES ON TEMPERATURE AND COW COMFORT

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Summary

Sunshades provide an effective method of reducing ultraviolet sunrays and increasing cow comfort.

(Key Words: Sunshades, Environmental Temperature, Cow Comfort.)

Introduction

Dairy cows have a zone of thermal neutrality within which they are comfortable based on measures of feed intake and milk production. Warm-season temperatures in Kansas average above 80 degrees F during the day, with incidences of 100 degrees + F. The upper critical temperature of dairy cows is defined as the temperature at which they must utilize energy to reduce body temperature. As the ambient temperature rises above critical temperature, feed intake is decreased, leading to a subsequent decrease in milk production.

The upper critical temperature is related to the level of milk production. Cows producing 100 lb of milk per day will be affected negatively at a lower temperature than cows producing 50 lb of milk per day. This occurs because higher-producing cows have an elevated metabolic rate and generate more heat during the digestive process at higher levels of feed intake. A decrease in milk production in the 100-lb producer might be observed at an ambient temperature of 80 degrees F, whereas the 50-lb producer might not show a decrease until the ambient temperature reaches 95 degrees F.

Sunshades are relatively inexpensive and easy to install in a dry lot or other loafing area. This study was conducted to determine the temperature differential existing between sites located under a sunshade and in direct sunlight.

Procedures

Ambient temperature in degrees Fahrenheit was measured with black bulb and bare bulb thermometers at 0730, 0900, 1030, 1200, 1330, 1500, 1630, 1800, and 1930 hr for 7 consecutive days at the Kansas State University Dairy Teaching and Research Center. Temperatures were measured in direct sunlight and under a sunshade. Thermometers were located 2 ft. above cow height at all sites. Cows were housed at all observation sites during the study. Black bulbs were used to provide a measure of ultraviolet sunrays that have been associated more with cow comfort than ambient temperature measured by bare bulbs.

Results

Black bulb readings averaged 4.9 degrees F lower during the day and peaked 8.0 degrees F lower under the sunshade relative to direct sunlight. Peak black bulb temperatures during the 7-day period were 106.3 degrees F in direct sunlight compared to 97 degrees F under the sunshade.

Black bulb temperature under the sunshade remained above 96 degrees F for approximately 1.5 hr during the day, whereas temperature in direct sunlight remained above 96 degrees F for approximately 6.25 hr.

Bare bulb temperatures were similar in direct sunlight and under the sunshade and were consistently lower than black bulb temperatures except at 730 and 1930 hr (Figure 1).

Conclusions

Sunshades reduce the exposure of cows to ultraviolet sunrays as measured with a black bulb thermometer but have little effect on temperature measured with a bare bulb thermometer.

Table 1. Effect of Sunshades on Temperature

	Bare bulb		Black bulb	
Measurement	Direct sun	Sunshade	Direct sun	Sunshade
Average temperature, °F	83.5	83.1	89.7	84.8
Average peak temperature, °F	91.4	90.0	104.0	94.1
Average hr of peak temperature	15:08	15:34	14:56	15:22

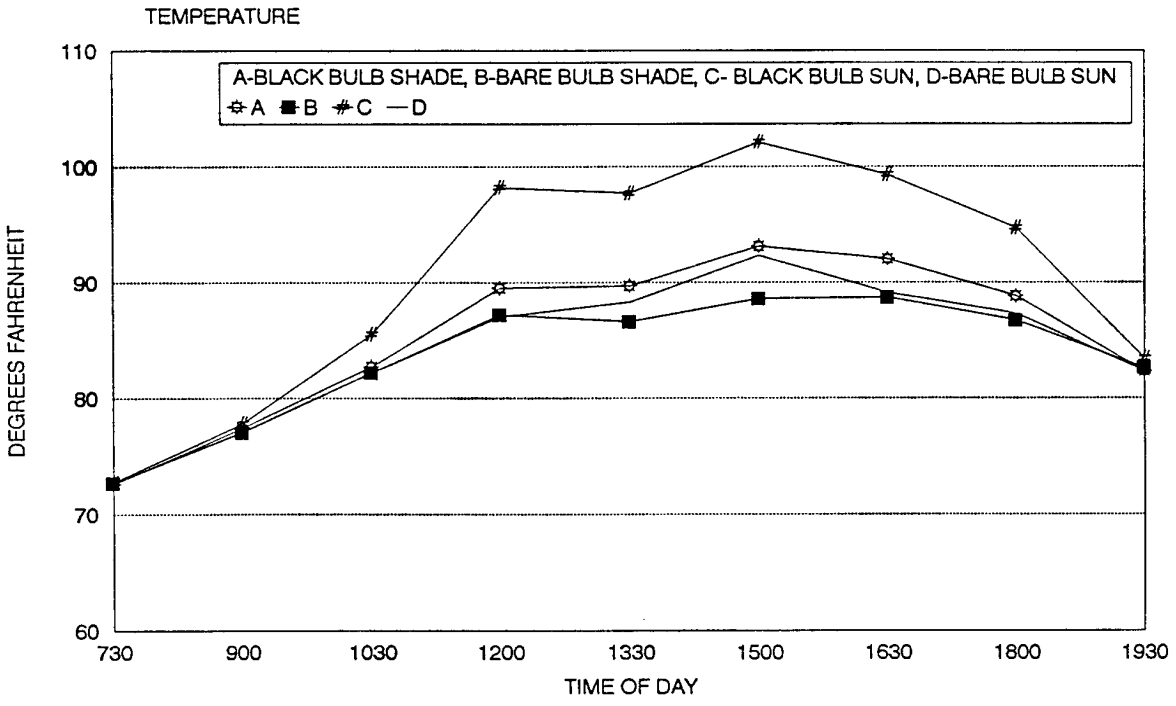

Figure 1. Effect of Sunshade and Time of Day on Temperature Readings with Black and Bare Bulb Thermometers