

Exploring Bovine Benefits of Increased Light Exposure

Milk production from cows is greater during the summer than during the winter. Day length, or photoperiod, is the suspected underlying reason. Recent studies suggest that increasing the photoperiod with electric light at night may increase milk production during the winter. In a field study funded by the New York State Energy Research and Development Authority (NYSERDA), the LRC and the Cornell Cooperative Extension are investigating milk production at a working dairy farm under three types of lighting. One barn is illuminated with a linear fluorescent lighting system designed for use in non-insulated barns. An adjacent barn is illuminated with LED sources. Both provide the same photopic illuminance levels on the barn floor (at night) at approximately 225 lux (lx). A portion of a third barn serves as a control. It is illuminated (at night) with a linear fluorescent lighting system that provides approximately 8 lx.

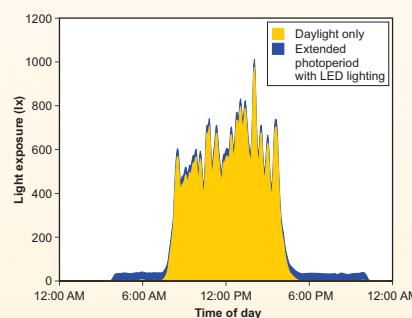


A Daysimeter attached to the cow's ear tag continuously records the light level in close proximity to the cow's eye. The Daysimeter also measures movement of the cow (i.e., activity level), which, together with light exposure, is used to measure circadian entrainment.



The Daysimeter package with special waterproof housing designed for use with cows

Light and activity measurements are also taken with the Daysimeter, developed at the LRC, for samples of cows housed in the three barns. A Daysimeter is attached to the ear tag of sampled cows four times during the year — fall, winter, spring and summer. From these light and activity measurements, it is possible to measure the circadian rhythms of the sampled cows and to determine how seasonal changes in the light-dark patterns might be correlated with milk production. Life-cycle cost analysis will be performed to determine how different lighting systems affect energy use and milk production at the working dairy.



The average daily light exposure, as measured by Daysimeters (blue area), for cows in the LED-lit barn during winter. The yellow-shaded area indicates light exposure without the LED lighting extending the photoperiod.

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