

HOW LIGHT AFFECTS YOUR HORSE

Nearly all organisms, including horses, adapt their lifestyles to the timing of sunrise and sunset. These light and dark cycles result in daily (circadian) and annual (circannual) rhythms of physiology and behavior. Understanding how horses respond to these cycles can help you manage them accordingly.

Barbara Murphy, PhD, assistant professor in University College Dublin's School of Agriculture and Food Science, in Ireland, has extensively studied circadian and circannual rhythms and how they affect horses. In this article, we'll describe some of her findings on how the strategic use of light can benefit breeding and performance horses.

BROODMARES

Circannual rhythms dictate mare reproductive cycles. In most of the northern hemisphere, the natural breeding season runs from April to October to coincide with longer periods of daylight and lower melatonin levels. Many breeders, particularly in the stock breed futurity and Thoroughbred racing industries, however, desire foals born as close to the beginning of the calendar year as possible. This necessitates breeding mares as early as February, so they produce January babies.

To achieve this, breeders have long used artificial light in the form of stable lighting and floodlights in paddocks to suppress melatonin and manipulate mare reproductive cycles. New research shows that light masks—which Murphy invented and produces with her company, Equilume—that deliver low-intensity blue light to one eye are equally, if not more, effective. As a bonus, she says, these masks allow mares to remain outside on pasture where they are less stressed and, thus, naturally more fertile.

On average, says Murphy, it takes 70 days from the start of light therapy until the mare first ovulates. One of the downsides to breeding mares this early, however, is they tend to have longer gestations,

How Does Light Affect Horses' Bodies?

When light enters the eye, specialized cells in the retina send a signal to the brain, which, in turn, sends a time-of-day message throughout the body. The hormone melatonin, which gets produced in darkness and is acutely sensitive to light, is an important transmitter of this signal. Not all types of light, however, are created equal. Blue light, which is present in high amounts in natural daylight, best stimulates the photoreceptors in the eye that regulate circadian rhythms. The fluorescent and incandescent lights we often use in our barns have minimal biological effect because they have very little blue light.

Light masks that deliver low-intensity blue light can help suppress melatonin and manipulate mare reproductive cycles.



COURTESY EQUILUME

resulting in later and later foals over time, pushing breeding dates later into the year. Further, study results have shown that foals born early in the year have lower average body weights than those born later in the year.

The solution? Murphy has found that putting light masks back on broodmares at least 90 days before they foal can return their gestational length to normal and help regulate their foals' birth weights.

STALLIONS

Changing day length can also affect stallion libido, sperm concentrations, and testosterone levels, with each peaking during the long days of summer. Murphy says research shows that "circadian lighting" that provides blue-enriched LED light by day; low-intensity red light at night; and gradual dimming or brightening of lights at dawn and dusk, respectively, can help improve stallion testosterone levels throughout the breeding season.

PERFORMANCE HORSES

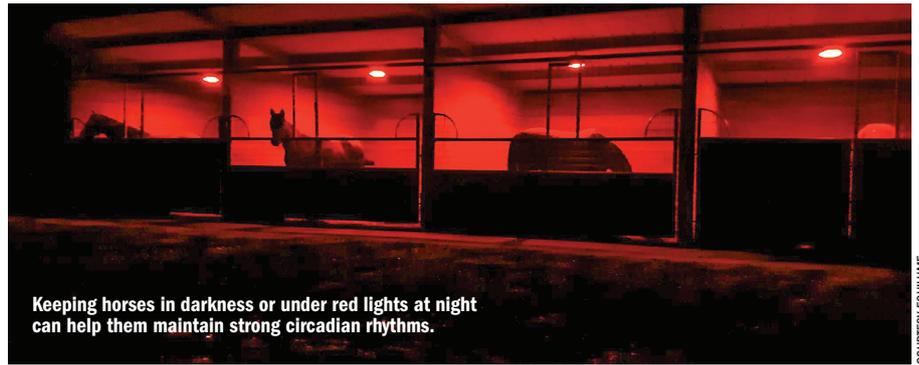
Performance horses in training typically spend most of their time in stalls. By stabling horses under fluorescent lights for much of the day (which offer very little, if any, blue wavelength light), we're failing to stimulate normal circadian rhythms, says Murphy. We need to mimic natural daylight in stables if we want to maintain good hair coats, musculature, immunity, and more (remember, light affects all body systems). For stalled performance horses to be at their best, Murphy recommends putting them under blue-enriched light during the day

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and keeping them in darkness or under red light at night, again with transition periods at dawn and dusk.

There's also a correlation between circadian rhythms and equine performance. Research has shown that if horses follow daily exercise regimens, their muscle genes will learn to peak at the time associated with that exercise, says Murphy. By training a horse at the same time each day, you're essentially training his muscles to perform at their best at that time.

Also consider how you're affecting your equine athletes' internal rhythms when you interact with them at night—to toss hay, do night checks, medicate, or change bandages, for instance. As soon as you flip that light



Keeping horses in darkness or under red lights at night can help them maintain strong circadian rhythms.

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switch, says Murphy, you've disrupted their circadian clocks, which can affect their sleep, cortisol (stress) levels, immune function, and performance. She recommends using red lights rather than fluorescent or incandescent when doing nighttime barn chores. Eliminating white light pollution at night is key

to allowing the body's circadian rhythms to remain strong, she says.

TAKE-HOME MESSAGE

Circadian and circannual rhythms can affect nearly every physiologic, behavioral, and metabolic response in horses' bodies. We must be cognizant of how our horse management practices might be inhibiting everything from their hormone levels to their immunity. Some relatively simple lighting changes can encourage horses to be alert during the day, rest at night, and maintain healthy body functions, says Murphy.

DID YOU KNOW?

Horses—particularly equine athletes that fly to competitions around the world—can suffer jet lag just like humans do. While they're immediately on a new light schedule, their body rhythms, such as core body temperature, do not align to the new time zone for up to 11 days, says Murphy. Knowing how to correctly manipulate lighting can help reduce the side effects of transmeridian travel.

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