BOVINE LIGHT MASK

Blue light from light-emitting diodes (LEDs) directed at a single eye elicits a dose-dependent suppression of melatonin in dairy cows

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Objective

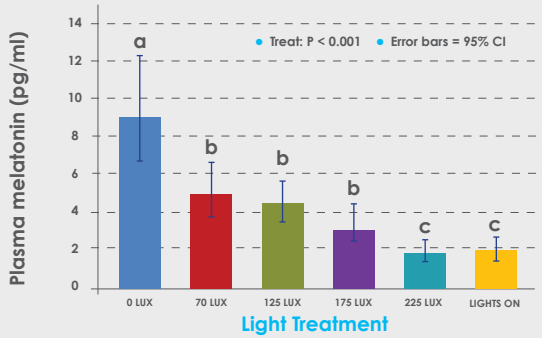
Identify blue light intensity required to suppress melatonin equivalent to overhead lights providing >200 LUX

Methods

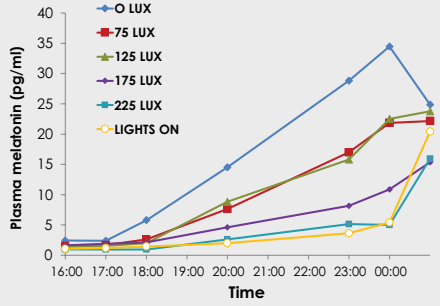
- 5 non-lactating dairy cows (5x5 LS)
- All environmental light sources blacked out
- Overhead lights on 08:00, off 16:00 (16D/8L)
- Head masks fitted with LEDs
- Short WL blue light (465 nm) to the right eye
- Light masks on from 16:00 to 00:00
- Treatment nights followed by break nights (16D/8L)
- Random sequence of
  - 0, 70, 125, 175 and 225 LUX light masks
  - Lights ON >200 Lux
- Blood sample collection
  - 1600 (before shed lights off/mask lights on)
  - 1700, 1800, 2000, 2300
  - 0000 (before mask lights off)
  - 0100
- Overhead LIGHTS ON for final sampling night

Results

Effect of Treatment (16:00 to 00:00)



Treatment by Time



Conclusions

- It is possible to suppress melatonin using light mask
- A light mask delivering 225 LUX blue light to one eye successfully suppresses melatonin to levels observed under brightly lit housing

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BOVINE LIGHT MASK

Extended photoperiod provided by light masks delivering blue light to a single eye increases milk yield in dairy cows

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Objective

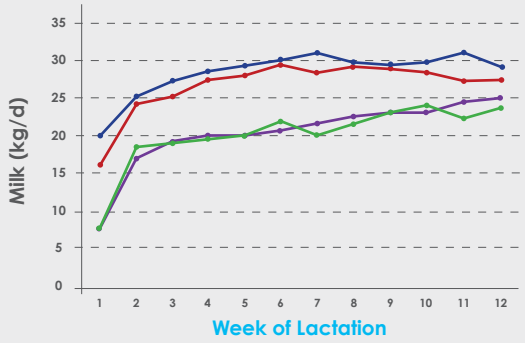
Determine if light masks fitted to pasture-based lactating cows influence milk yield

Methods

- 40 Spring calving cows divided into two groups:
  - Control (no light)
  - Treatment (blue light to a single eye)
- Light Masks were fitted to treatment group on day of calving
- Light masks were active from 5pm until midnight daily
- Milk yield monitored for first 12 weeks of lactation

Results

9% increased milk yield in multiparous cows wearing light masks



- Light: Primiparous cows
- Control: Primiparous cows
- Light: Multiparous cows
- Control: Multiparous cows

Conclusions

- Mobile light therapy offers a potential method to significantly increase production efficiency in multiparous cows
- Mobile light therapy may enhance sustainability for grass based dairy production
- Prototype refinement should elicit further yield increases
- Further research will identify additional applications for fertility, growth, health and welfare

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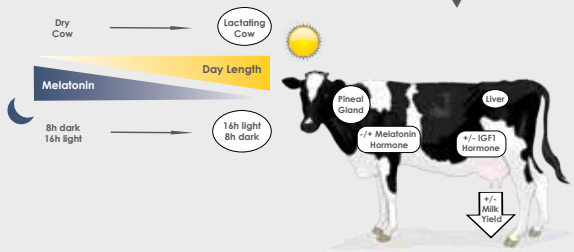
INTRODUCTION

Melatonin is a pineal hormone produced during the hours of darkness, its pattern of secretion mimicking the light/dark patterns that occur during each 24 h cycle. It acts as the daily decoder of seasonal changes in day length and regulates the circa-annual reproductive cycles of seasonally breeding mammals.

Horses

Artificial light has long been used to inhibit melatonin and advance the breeding season in horses to meet the commercial needs of the industry. Dr. Barbara Anne Murphy (founder and CSO) of Equilume and her research team at University College Dublin, investigated the threshold level of blue light required to inhibit melatonin levels in the horse. From this research, the Equilume Light Mask was created.

Cows



The biological effect of different photoperiods on the melatonin secretion in the dairy cow

It was first reported in 1978 that long days have a stimulatory effect on milk yields. Multiple studies have shown that 16h light and 8h dark result in a 2-3kg increase in milk yield per day.

This effect is sought to be linked to a photo stimulatory increase in insulin-like-growth factor 1 (IGF1).

Equine Research

The Dairy Industry

There is a global milk shortage and lack of sustainability within the global dairy industry. Of approximately 252 million dairy cows, up to 50% are grass based and mainly maintained outdoors. Intensive indoor systems benefit from the use of artificial light to increase milk production by 10%. One of the goals of research undertaken by the Circadian Group is to evaluate if this increased productivity can also be realized on grass based dairy farms.

"To be the global leader in science based animal performance lighting" Circadian Group

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