



LED Lighting and the Farm Presented by Bart Schultz, Illumination Specialists LLC.

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LED Lighting vs. HID Lighting

LED Lighting

- ▶ Durable
- ▶ Energy Efficient
- ▶ High quality of light
- ▶ Constant brightness
- ▶ Up to 100,000 hours of operation
- ▶ Average return on investment under 3 years
- ▶ Environmentally safe

HID Lighting

- ▶ Fragile
- ▶ Energy Wasted from ballast/heat
- ▶ Poor light quality based on light spectrum
- ▶ Reduced brightness annually
- ▶ Average 20,000 hours of operation
- ▶ 3 times more expensive to operate
- ▶ Bulbs and ballasts must be recycled as hazardous material

Energy Efficiency

Most Led lights are between 50-75% more efficient than HID bulbs. One of the main reasons for increased efficiency is the directional operation of the LED lighting. Where HID has misdirected light, LED light allows for directional light. This increases the benefits for dark sky compliance. LED lights also do not require a ballast that can require up to 20% of the energy consumed by the entire fixture i.e., a 400W MH bulb requires 40W to 80W to power the ballast, making this fixture consume 440W to 480W were a quality LED fixture would only consume 100W-150W

Quality of LED Lighting

LED Lighting tends to have a higher quality of light, with the quality of lighting being maintained for much longer periods of time. The quality of light is usually measured in CRI or Color Rendering Index. LED Lights tend to have a CRI rating of between 85 and 95 on a scale of 100. Also, color temperature enhances this light quality. The color temperature index ranges from 1000K or candle light to 28,000K or Extreme Blue northwest sky. The optimal temperature would be 4800K which is noon day sun. LED lighting has a full range of color temperatures. This increased quality promotes a more natural light for the cows which has been known to increase milk production. Long day lighting has been known to increase milk production on average of 4-7lbs/day. The long day lighting and the more natural light (Similar to natural sunlight) from LED has proven to increase milk production.

Lumen Depreciation

All high wattage light sources including HPS, Metal Halide, Fluorescent, and even LED are brightest when they are new. As they age lumen output decreases, with some light sources depreciating faster. For example, Metal Halide bulbs lose 40% of their lumen output in the first year, and fluorescent bulbs lose between 10-15% in the first 4000 hours of operation. LED lighting maintains above 70% of original lumens at 50,000 hours. This high level of maintained lumens reduces maintenance and replacement to maintain optimal foot candle readings for long day lighting.

ROI under 3 years

Average free stall barn:

Existing 48 400W Metal Halide fixtures

Replace 48 400W MH fixtures with 48 150W LED fixtures

Assume .10/Kwh

Assume 16 hours of operation/day X 365 = 5840 hours annually

$440W \times 48 = 21,120W / 1000 = 21.12Kwh \times .10 = \$2.112/\text{hour}$ or \$12,334.08/year

$150W \times 48 = 7,200W / 1000 = 7.2Kwh \times .10 = .72/\text{hour}$ or \$4204.80/year

Annual energy savings of \$8,129.28

Cost of 48 150W LED High Bay fixtures \$19,152 installed

ROI for just energy savings with no maintenance is 2.36 years

LED Lighting is Environmentally Safe

LED lighting is typically made from completely recyclable materials such as Aluminum and plastic. HID lighting has ballasts that are environmentally unsafe as are the bulbs for the fixtures. For the most part LED Lighting is much more environmentally safe for use and disposal.

Sources

[HTTP://energyefficientdevices.org](http://energyefficientdevices.org)

[WWW.milkproduction.com](http://www.milkproduction.com)

www.hotwattsolar.com