

Poultry House Dimmers And LED Bulb Damage

In the past decade the whole world and the broiler industry have transitioned from incandescent bulbs to dimmable LED bulbs. This transition has caused much frustration and many growing pains for the general public and the poultry industry. The transition to LED technology has greatly reduced poultry growers' power bills, and LEDs have shown much longer bulb life. However, widespread problems with premature bulb failures, erratic dimming performance and rapid lumen depreciation (light loss over time) have been observed. These factors are especially problematic with inexpensive, omni-directional LEDs intended for household use, but have been observed in even high quality, heavy duty, directional LEDs designed to withstand the rigors of modern broiler houses. The environment, level of dimming, and the changes required over the flock require that bulbs and dimmers being used be designed for poultry housing and be designed to be compatible with each other. Household duty bulbs bought at big box stores will simply not hold up in poultry house applications. Also, as LED bulbs have improved and become more efficient, the need for dimmers and dimmer technologies to be updated and improved has also increased. Today, LED engineers have overwhelmingly determined that leading edge dimming of the waveform is less efficient and more problematic than trailing edge dimming. Older dimmers and older dimming techniques do not operate well with today's poultry LED bulbs and should not be used. In summary, in just the past 5 or so years, dimmer controlling technologies have rapidly changed during the corresponding shift from incandescent to LED bulbs.

Overdrive, in concert with University scientists and independent private sector engineers, undertook multiple unbiased tests and measurements to identify the causes of degraded bulb performance. Recently (July, 2020), an unbiased engineering test laboratory was utilized to investigate these issues in detail. Most of the manufacturers of LED chips have indicated that exposure to overcurrents greater than 300 milliAmps will cause damage within the bulb, typically observed in the field as premature failure, erratic performance, or accelerated lumen depreciation. These overcurrents tend to be observed more frequently with leading edge dimming.

Testing results indicate that several common poultry house dimmers are, in fact, producing large numbers of overcurrents throughout the dimming curve (percent dimming). The charts below were produced from the data recorded during testing. As can be easily seen, dimmer output current (blue line) and current to the actual LED chips (red line) for Dimmer #1 and Dimmer #3 (leading edge) produced overcurrents in excess of 300 milliAmps throughout most, if not all, of the dimming range. Dimmer #2 (Overdrive) produced current readings well below the 300 milliAmp damage threshold (green dotted line).

Since chip damage is not reversible, the logical conclusion from this test is that many poultry house dimmers currently are causing irreversible damage to the LED bulbs, regardless of bulb brand.

