

Cheeps & Chirps

..... Points for Poultry Profitability

VOLUME 12, ISSUE 4

NOVEMBER 2020

INSIDE THIS ISSUE:

Farming and mental health resources 1

2020 4-H egg preparation demonstration goes virtual 2

2020 KPF Scholarship 3

2020 KPF Environmental Award winners 4

Joey Long inducted into the KPF Hall of Fame 5

Lynde Hughes inducted into the KPF Hall of Fame 5

Issues with poultry house LED lamps and light dimmers 6

Poultry industry creates jobs in Kentucky 10

FARMING AND MENTAL HEALTH RESOURCES

Today farmers are facing their worst-case scenarios. Chicken farmers have had to depopulate, and hog farmers euthanize their pigs, as meat and poultry processing facilities get hit with COVID-19 among their employees and must shut down. Dairy farmers have had to dump their milk and/or sell their cows as beef as the marketing systems breakdown with the switch from supplying bulk producers such as schools, universities, restaurants, etc. to supplying individual consumers for home consumption. Similarly, crop producers have had to plow under their crops because they cannot be harvested and shipped to market.

For all these farmers there is the economic stress of losing this year's crop after months of hard work. For livestock and poultry farmers, there is the added emotional stress of having to depopulate their flocks or herds.

While the term 'human-animal bond' is usually thought of as being related to a person's attachment to their pet or service animal, the owners and caretakers of animals that we rely on for meat, milk and other agricultural products also form a bond with their animals.

According to Dr. Janice Swanson, director of Animal Welfare for the Michigan State University College of Agriculture and Natural Resources' Department of Animal Science, it is just a different type of bond. According to Swanson, "the relationships we have with production animals are different from those we have with companion animals, but it doesn't make them any less important. Just different." Much of the difference relates to the fact that farm animals are managed in large groups so using names and relating to individual personalities are typically unrealistic. But that does not mean the human-animal bond does not exist. Farmers still form bonds with their livestock.

While pet animals are kept as companions, production animals have a different purpose. They support the demand for food and other by-products around the world. Sometimes that purpose is tied to their death. Farmers do have empathy with their animals that helps

(Continued on page 2)

2020 4-H EGG PREPARATION DEMONSTRATION GOES VIRTUAL

With COVID19 restricting in-person events, this year's state 4-H egg preparation demonstration contest went virtual. The contest is sponsored by the Kentucky Poultry Federation and involves participants cooking an egg-containing dish while discussing the benefits of eggs.

In the senior division was (14 years of age by January 1) the winner was Anna Sweets from Warren County with her mini egg sliders (top photo on the right). In addition to her Grand champion ribbon, Anna will receive a check for \$225.

In second place in the senior division was Joshua Martin, also from Warren County, and his Break and Bake dish (bottom photo on the right). His dish involved cooking eggs in a



FARMING AND MENTAL HEALTH RESOURCES *continued*

(Continued from page 1)

them to set standards on how those animals are cared for.

Handling production animals properly requires farmers to focus on all the same basic welfare aspects that pet owners focus on for their animals. Proper nutrition, low-stress environments, prompt health care, and preventative medicine.

Many livestock industries are not lucrative. Farmers do what they do because they have a passion for farming and a love for their animals. The bond between farmer and animal is not strictly financial.

More than 450 farmers killed themselves across nine Midwestern States from 2014-2018. **It is important for farmers to know they are not alone.** There are hundreds or even thousands of other farmers facing the same challenges. They are trying to deal with the mental and emotional consequences. There are resources for farmers to help them deal with stress, address their mental health, and prevent suicide.

If you or someone you know is struggling, please seek help. If you don't take care of

yourself first, you cannot take care of your farm, your family, and your community.

If you, or someone you know is struggling, **please seek help** from one of the resources below, or from your state or local farm bureau or ag extension office:

National Suicide Prevention Lifeline

<https://suicidepreventionlifeline.org/>
+1.800.273.8255

Farm Crisis Center

<https://farmcrisis.nfu.org/>

American Farm Bureau Federation

<https://www.fb.org/programs/farm-state-of-mind>

Do More Agriculture Foundation

<https://www.domore.ag/>

Healthy Place

<https://www.healthyplace.com/>

Written by:

Dr. Jacquie Jacob
Poultry Extension Project Manager
Department of Animal and Food Sciences
University of Kentucky



2020 4-H EGG PREPARATION DEMONSTRATION *continued*



muffin pan. A great way to pre-cook your eggs for breakfast. He will receive a Reserve Champion ribbon as well as a check for \$125.

Both seniors did a great job and it is unfortunate that there will no national

contest this year for them to participate in.

In the Junior division, the winner was Colton Kearns from Boone county and his lemon pie (top photo on the right). He will receive his Grand Champion ribbon and a check for \$225.

Second place in the junior division was Christopher Sweets from Warren County with his Chess Pie bottom photo on the right). He will receive his Reserve Champion ribbon and a check for \$125.



2020 KPF SCHOLARSHIP WINNERS

The Kentucky Poultry Federation (KPF) awarded four students with scholarships during the virtual Kentucky Poultry Festival Hall of Fame Banquet.

The Kentucky Poultry Federation President, Dan Flanagan, presented four individual, \$2,000 academic scholarships to Oliva Henson, Corey Latham, Lauren Hughes, and Margaret Morrison.

The Kentucky Poultry Federation academic scholarships were established to benefit the children and grandchildren of Kentucky poultry complex employees, growers, and allied members. The scholarships assist with graduating high school seniors or currently enrolled college students in continuing their education. Applicants are required to submit a completed application, current transcripts, two letters of recommendations, and two essays.



Olivia Henson was the Valedictorian for the 2020 Livingston Central graduating class and is a freshman attending Murray State University in Murray, KY. Olivia is majoring in elementary education. Olivia values education and that is what drives her to teach the future generations. Along with education, family is very important to her and spending time with her Grandpa, who grows with

Pilgrim's in Smithland, KY, has taught her about the poultry industry.



Corey Latham graduated from Clinton County High School and is attending Somerset Community College with a focus in Science and Math. Corey plans to attend Western Kentucky University to complete his bachelors in either engineering or optometry. Corey was active in FFA in high school and wants to further his knowledge in agriculture production, to run his own farm in the future. Corey hails from Albany, KY and his father, Eric Latham is an Employee of Tyson Foods.



Lauren Hughes graduated from Wayne County High school and now attends the University of Kentucky in Lexington. Lauren is majoring in business. She plans to use her business degree to run her own horticulture business, combining her passion for helping people and agriculture. Lauren believes that agriculture, including the poultry industry is crucial in supporting the local community. Lauren's stepmother, Ann, works for Cobb-Vantress, in Monticello, KY.



Margaret Morrison hails from Wingo, Kentucky. She is currently a senior at Murray State University, majoring in Agriculture Science technology with an emphasis in Public Service and Leadership. Her passion for agriculture stems from a passion for caring for others. Margaret plans to pursue her goal of being an agriculture extension agent to connect the community with important agriculture commodity groups. Margaret's father, Tim, is a grower for Tyson.

The Kentucky Poultry Federation was organized in 1957 as a civic and educational non-profit corporation. The federation exists for the purpose of fostering, promoting and encouraging the improvement of production and marketing of all types of poultry, poultry products, eggs and egg products in Kentucky. To be notified about the release of the 2021 KFP Scholarship application email Jamie Guffey at jguffey@kypoultry.com or visit www.kypoultry.org.

2020 KENTUCKY FAMILY FARM ENVIRONMENTAL EXCELLENCE AWARD WINNERS



The Kentucky Poultry Federation (KPF), Dr. Tony Pescatore, presented two Kentucky poultry farms with The Kentucky Poultry Federation Farm Family Environmental Excellence award during the virtual Annual meeting. The two farms were recognized due to their unique litter management practices, community involvement, conservation techniques, nutrition management, and environmental management.

propane costs and the carbon footprint. Chore-time Chortronic 3 technology assists in controlling environmental conditions and tracks the birds to assist their environmental needs. Sonny and his fiancée, Whitney said their goal is to “create sustainability for future generations. We have a passion to instill in our children the responsibility we all have for caring for our environment.”



From Left to right: Earl “Sonny” Woolf Jr., Whitney, Mathiah, Brayden, and Kaler (front)

Woolf Farms

Woolf Farms is owned and operated by Earl “Sonny” Woolf Jr. of Mayfield, KY. Woolf Farms started in 2015 when Sonny purchased a 1997 poultry operation that consisted of six barns and 67 acres. Now the operation has grown to eight poultry barns and has a flock of 196,200 broiler birds. Woolf Farms is contracted through Tyson and hosts potential, new growers to have first-hand experience in what poultry growers do daily to feed the world.

Sonny has dedicated time to water conservation by creating a natural reservoir that slows runoff and creates a self-sustaining water cycle. Buffer zones and gravel drip lines help decrease erosion and increase drainage away from the houses. Inside the houses energy efficiency and increased productivity means that Woolf Farms is always focused on improvements. AV heaters have been added to reduce



Brian Hayden

Twin Lakes Poultry, LLC

Twin Lakes Poultry is owned and operated by Brian Hayden and his mother Debbie, in Calhoun, Ky. Twin Lakes Poultry has six broiler houses and produces birds for Perdue Farms. Brian has made it a priority to attend trainings offered through the extension office or Perdue to better equip himself in conservation efforts. This includes using 65% of the litter on the no-till crops and 35% for cattle pasture. The poultry houses utilize water from two lakes that pump water directly to the houses. The water is filtered through a sand filtration system and chlorinated for the birds to drink.

In 2018 solar panels were installed to the poultry houses. Brian wanted to continue decreasing the farms carbon footprint, while also increasing cost efficiency. Composting is another tool that Twin Lakes Poultry incorporates to prevent spreading disease and replenish the 550 acres of soil. Brian said that he wants “to be a good steward of the land and environment. I want to keep this place great for the future generations”



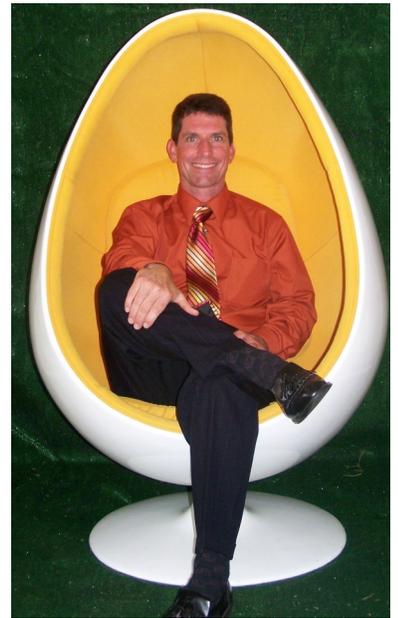
JOEY LONG INDUCTED INTO THE HALL OF FAME

Poultry has always been in Joey's blood. As a young boy, he would accompany his father to work at Kimber Farms turkey hatchery in California. When he was 10 and living in Chariton, Iowa, he would go to the Williams Turkey Breeding Farms hatchery on Saturday mornings, with his father, and for 15¢/hour, would transfer eggs from the incubators to the hatchers. The family then moved to North Carolina, where Joey attended high school and worked for Goldsboro Milling Company. He became a Wolf-Packer at North Carolina State University and received a degree in Poultry Science in 1980.

He worked at a few different jobs after college, including transporting poult and driving mules at Middleton Place in Charleston, South Carolina, before landing his first true "professional" job, with Cargill in 1984. In 1988, the egg division of Cargill was acquired by Cal-Maine Foods. In 1999, he was transferred to Guthrie, Kentucky and remains there today.

Joey is the devoted father of three children, Caitlin, Adam, and Patrick. From cheering on Caitlin during soccer, to coaching in-line hockey with Adam, to being the unofficial roadie and equipment manager of Patrick's bands, he has always been supportive and involved. He currently is the proud grandfather of Francis and Faustina, both of which give him great joy!

Joey loves adventure. Twice, he completed "The Assault on Mount Mitchell", a 102.7-mile bike event, along the Blue Ridge Parkway. When in Minnesota, he participated in a winter cross country skiing and camping adventure in the Boundary Waters as part of a fund raiser for the Minnesota Lung Association. In 2008, in celebration of his 50th birthday, Joey hiked to the summit of Mt. Rainier, an elevation of over 14,000 feet. Currently, he loves to kayak and will take any opportunity, be it warm or cold weather, to enjoy a paddle on the rivers in Tennessee.



LYNDE HUGHES INDUCTED INTO THE HALL OF FAME

Lynde Hughes is a man with varied interests and hobbies. He was born in Texas and moved to Louisiana as a teenager. His southern roots and avid outdoor interests are evident throughout his life. He received his bachelor's degree from Louisiana Tech University prior to entering the industry. He always jokes that he had 17 years with Con-Agra and was one of those ex-cons. Lynde's sense of humor and wit have been prevalent throughout his career in the industry and with the federation. Lynde Hughes started working for Perdue in Beaver Dam in 1997 and retired after 22 years working in Kentucky's poultry industry. Lynde saw the start of Kentucky's poultry industry and watched it grow to Kentucky's number one agricultural commodities.

He is an avid reader and is always willing to share or recommend his favorite books. One of his favorite authors is Michael Connelly who has authored over 40 books – Lynde states "I have read them all." The Harry Bosch series is his favorite. Kathy and Lynde even like the TV show that follows the series.

Lynde is also a bike enthusiast and has rode over 2800 miles this year. He enjoys his 34-mile loop around his house. During the winter, he transitions from biking to swimming with his wife at the local Recreation Center.

Lindy operates a 17-acre hobby farm, with plenty of pasture for the horses and a pond for him and the dog, Archie, to swim in. He is currently enjoying the retirement lifestyle. He thinks every day is like Saturday when you retired.

If you are around Lynde any amount of time, you will know

that he brags about his daughters. He proudly told me that only 2% of college graduates become doctors, and he and his wife Kathy have two of them. Hannah, & Allyson.

Lynde served 2½ terms as president of the Kentucky Poultry Federation. Lynde's dedication to our industry was obvious with his willingness to be involved and share his opinions to help promote and grow the poultry industry. One of his most notable contributions to the organization was partnering with Dr. Tony Pescatore to increase The Kentucky Poultry Federation scholarships by funding them through the silent auction revenues, thus providing many deserving students an opportunity to continue their education.



Issues with Poultry House LED Lamps and Light Dimmers



LED lamps have changed the landscape for poultry growers in terms of energy savings related to poultry house lighting. No other lighting source (incandescent, compact fluorescent, cold cathode, high pressure sodium, etc.) comes close to the energy efficiency of LEDs. LEDs are roughly 80–85 percent more efficient than incandescent lamps. However, during the transition from incandescent to LEDs, there have been some hiccups (Tabler et al., 2019).

Starting late last fall, we began getting an increase in calls from growers concerning strange dimming issues and premature LED lamp failures. Trips to various poultry supply vendors and LED distributors revealed boxes and boxes of failed LED lamps (still under warranty) of various brands that had been returned by growers. Through conversations with these vendors and distributors, we determined that the premature lamp failure problem had been steadily increasing in recent months.

This is not normal nor expected, and it led us to dig a little deeper into what was going on. While we haven't solved all the problems, we now better understand much of what is causing premature LED lamp failures and why some LEDs are losing brightness much more quickly than expected. Like many other complicated issues, it is not just one thing causing these problems. A part of the issue is the lamps, a part is the light dimmer, and a part is the compatibility between the lamps and the dimmer.

Incandescent and LED Lamps

Thomas Edison patented the incandescent light bulb (Figure 1; left) in 1879. It became one of the most world-changing inventions ever conceived. It produces light by forcing electrical current through a high-resistance tungsten filament. The result is about 80 percent heat and 20 percent light. Newer LED lamps (Figure 1; center, with globe removed, and right) produce light by switching current to a series of light-emitting diodes. LED lamps contain circuitry that includes drivers and light-emitting diode chips (Figure 2). Modern LED lamps are very efficient in comparison to Edison's incandescent lamps. However, incandescent lamps are much easier to dim. In contrast, LED lamps are much more sophisticated and require special considerations for dimming and proper performance.

In less than a decade, the entire world (poultry industry included) has made a dramatic shift from incandescent lamps to dimmable LED lamps. Despite some growing pains along the way, the energy savings and long-life potential of LED technology made the frustration worth it. However, within the poultry industry during the past 8 to 10 months, widespread problems with rapid



Figure 1. Incandescent (left) and LED lamps (center, with globe removed, and right).



Figure 2. LED lamp with globe removed to show LED chips.

lumen depreciation, erratic dimming performance, and premature total lamp failure have been reported on LED lamps that were only 2 to 3 years old; in many cases, several years before the warranty had expired.

Investigations have determined that multiple brands of LED lamps are affected, but the issues are particularly severe with inexpensive, omni-directional LEDs intended for household use and not designed for the more demanding and harsh chicken house environment. However, the issues are also present in high-quality, heavy-duty, directional LEDs specifically designed to withstand commercial poultry industry demands. In today's chicken house environment, the level of dimming and the wide variation in light levels required over the life of the flock demand that lamps and dimmers be compatible and designed to work well with each other.

While they are less expensive than high-grade agricultural LED lamps, household LED lamps do not hold up well in a poultry house environment and

growers are often disappointed with their performance. In addition, LED lamp technology continues to improve and become more cost- and energy-efficient each year. As a result, dimmers and dimmer technologies must also be updated and improved to remain compatible with rapidly improving LED technology. Increasing evidence continues to point to the fact that dimmers with older dimming technology are not compatible with modern LED lamp technology. In other words, **older style dimmers and modern LED lamps simply do not work well together**, and this is causing many of the dimming and premature lamp failure issues.

No one realized 5 years ago that dimmers and LED lamps weren't working well together, but we have since learned a great deal more about how dimmer operation may affect LED lamp life and performance. When the transition to LED lamps first began, we thought we had gotten a lucky break when our new LED lamps worked without changing the dimmer. However, as our pool of knowledge continues to increase in this area, **we need to question the wisdom of not changing the dimmer**. It's somewhat complicated and requires some understanding of how electricity works, but **here's why we may need to consider changing light dimmers** when using LED lamps.

How Dimmers Work

Alternating current (AC) has varying voltage polarity in an undulating sine wave that fluctuates from positive to negative voltage. In the U.S., this alternating cycle happens 60 times per second. This frequency is referred to as hertz. Common electrical supply in the U.S. is 60 hertz (the current "alternates" 120 times, or 60 cycles per second). Light dimming is possible because a dimmer chops off a percentage of the phase angle of the AC sine wave. The amount of the wave that is chopped off determines how bright or dim the lights are. If only a small amount of the wave is chopped off, the lights remain fairly bright. If a large amount of the wave is chopped off, the lights may be quite dim. There are two main dimming methods used to chop the sine wave, depending on whether the front edge or back edge of the sine wave is chopped:

1. **Leading-edge dimming** utilizes a current that is turned off as the AC sine wave begins, just after it crosses zero into positive territory. It cuts the front edge of each wave's half-cycle. Leading-edge dimming creates a rush of voltage every half-cycle, resulting in a rush of current to the light source. Also called forward-phase control dimming, **leading-edge dimmers can produce spikes in current that can cause increased stress to electronic drivers** (Liao, 2014). These current spikes are likely at the root of the issues we are seeing with LED lamps. Most LED chip manufacturers have indicated that exposure to current greater than 300 milliamperes will cause irreversible damage to the chips, which is typically observed in the field as erratic performance, excessive lumen depreciation, and premature lamp failure.

Leading-edge dimmer switches are simpler, less expensive, and much more common today than trailing-edge dimmers. They typically use

a TRIAC (triode for alternating current) switch to control power. TRIAC dimmers have been used since around 1960 and were originally designed to dim incandescent and halogen lamps and wire-wound magnetic transformers. Many leading-edge dimmer switches have a relatively high minimum load, which often rules out their use with modest-load LED circuits. This explains why it is sometimes necessary to put an incandescent lamp at the end of the line in a chicken house to help the dimmer find enough load to properly do its job.

2. **Trailing-edge dimming** (electronic dimming) utilizes a current that turns off as the AC sine wave ends, just before it crosses zero into negative territory. **Trailing-edge dimmers are more sophisticated** than leading-edge dimmers and provide smoother dimming control with less interference. They have been designed specifically for use with low-wattage LED lamps. Trailing-edge dimmers usually use a MOSFET (metal oxide semiconductor field effect transistor) or IGBT (insulated gate bipolar transistor) switch rather than a TRIAC switch and coil (ERP Power, 2016).

Trailing-edge dimmers have a much lower minimum load than leading-edge, **making them much more suitable for powering modest-wattage LED lamps**. Also called reverse-phase dimming, **these dimmers avoid current spikes** by switching the light phase circuit on just as the current changes direction and allowing the voltage to rise gradually before turning it off later in the half-cycle.

Unlike incandescent lamps, LED lamps have a built-in driver at the base. The driver converts AC power to direct current (DC) power and maintains a constant current supply to the LED lamp. This is in direct opposition to the phase-control dimming system used to dim the lights because **the driver in the LED lamp tries to compensate for the chopped-out portions of the input voltage and maintain a constant current to the lamp**. LED lamps rely on the driver circuits to provide constant DC current to the LED chips for proper performance. **LED chips are current-sensitive devices** and require good-quality, constant DC current (but not overcurrent spikes). **For an LED lamp to work properly with a phase-control dimmer, the electronics of its driver must be compatible with the dimmer**. Leading-edge dimmers work best with resistive loads (incandescent lamps). Trailing-edge dimmers work best with capacitive loads (LED drivers).

The incompatibility between LED drivers and TRIAC dimmers can cause multiple problems (Liao, 2014), including:

- **pop-on**, when the LED lamp suddenly turns completely on as the dimmer switch is gradually raised from the fully off position.
- **dead travel**, when changing the dimmer setting produces no visible change in light level.
- **drop-out**, when the lamp shuts off completely as it is being dimmed.
- **ghosting**, when light is still visible from the lamps even when the dimmer is fully off.

- **audible noise** from the lamp.
- **flicker or strobing** resulting from the current being applied by the driver to individual LEDs.

What to Do?

This is a tough question. As mentioned earlier, premature LED lamp failures are not the result of any one thing. It is critical to assess your unique situation and determine exactly where the problem lies. Again, **inexpensive big box store LEDs should not be used in chicken houses.** They are designed for households and not for the demanding workload that a poultry house environment requires. Also, if you switch to LED lamps from incandescent lamps or CFLs, you must have **good-quality, keyless sockets and proper wiring.** Inferior wiring and corroded sockets are not compatible with LED lamps. In addition, all lamps in a house should be of the same brand, wattage, and color (Kelvin rating). Different lamp manufacturers likely use different drivers that will act differently when dimmed, disrupting the light uniformity level throughout the house.

Perhaps the biggest concern is **LED lamp incompatibility with the current poultry house dimmer.** Like LED lamps, there are a variety of light dimmers used in poultry houses today. Unfortunately, information from numerous sources, including poultry industry executives, academia, lamp manufacturers, dimmer manufacturers, LED chip providers, and utility company power quality engineers, indicates that many common leading-edge poultry house light dimmers are producing large numbers of current spikes throughout the dimming curve. Independent dimmer testing on leading- and trailing-edge dimmers indicates that dimmer output current (blue line) and current to the actual LED chips (red line) for leading-edge dimmer #1 and leading-edge dimmer #2 produced current spikes in excess of 300 milliamperes throughout most, if not all, of the dimming range (green dotted line), while the trailing-edge dimmer produced current readings well below the 300 milliamperere damage threshold (Figure 3).

As a result of current spikes associated with leading-edge dimming technology, it is quite likely that leading-edge poultry house dimmers are causing irreversible damage to LED lamps, regardless of lamp brand or dimmer brand. Some LED lamp manufacturers are now manufacturing their own dimmers to work with their own lamps. Unfortunately, not all dimmers

will work well with all lamps, and many older technology dimmers currently in poultry houses are not designed to handle sophisticated LED technology, which may result in lamp performance issues or premature lamp failure.

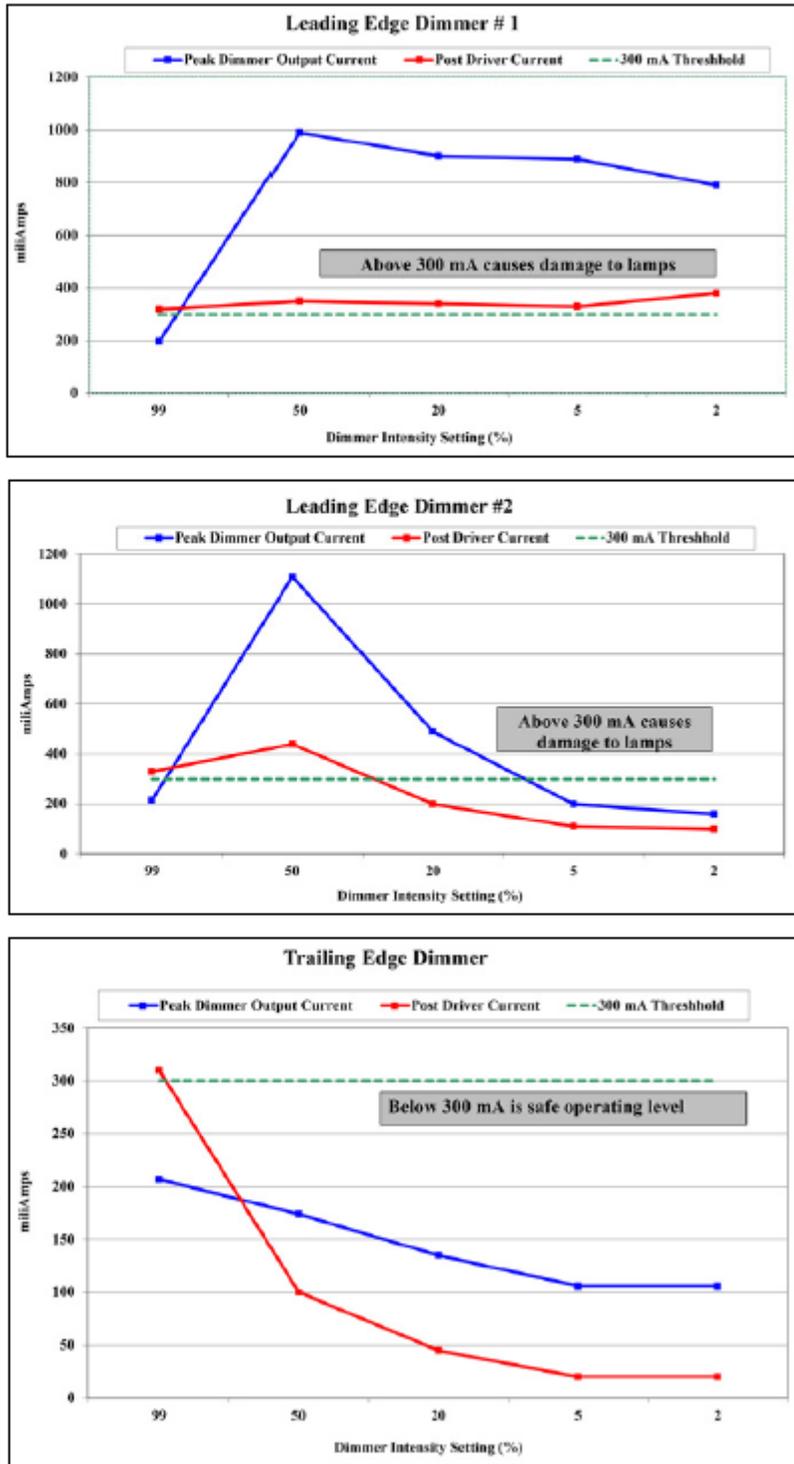


Figure 3. Current outputs of leading-edge and trailing-edge poultry house light dimmers.

Leading-edge dimmers were designed to dim incandescent lamps and are excellent at doing so. However, they are not compatible with today's advanced LED technology. Leading-edge dimmers are simpler and less expensive to manufacture, and while most traditional poultry house dimmers today are of the leading-edge variety, we are seeing increasing evidence that the **best dimming technology to couple with LED technology in chicken houses is trailing-edge dimmers.**

Summary

Poultry growers have seen remarkable energy savings from transitioning from incandescent to LED lamps. However, recently there have been an increasing number of issues with erratic dimming, excessive lumen depreciation, and premature lamp failures. Evidence points to an incompatibility between LED lamps and the light dimmer as the main cause of these issues. Reports from both the lab and the field tend to indicate that **leading-edge dimmer technology and modern LED lamp technology are simply not compatible.**

Leading-edge dimming technology tends to produce current spikes that are detrimental to LED chips in the lamps. **The damage to LED chips caused by these current spikes appears to be cumulative over time and is irreversible.** It will eventually lead to accelerated lumen depreciation, strange and erratic dimming problems, and premature lamp failures. Leading-edge dimmers are, by far, the most common light dimmers in poultry houses today. However, trailing-edge dimmers are much more compatible with today's LED technology.

We will continue to follow this situation. However, it may be that **poultry growers should consider switching to trailing-edge dimmer technology** to alleviate incompatibility issues between LED lamps and leading-edge dimmers. No grower wants to spend money needlessly, but neither do they want to deal with continuing dimming issues, excessive lumen depreciation, and premature bulb failures if a trailing-edge dimmer will stop the problem.

References

- ERP Power. 2016. The trailing edge dimmer for LED lighting control. Available at: <https://www.erp-power.com/the-trailing-edge-dimmer-for-led-lighting-control/>. Accessed: August 5, 2020.
- Liao, A. 2014. LEDs: A deep dive in dimming. Architectural Lighting. Available at: https://www.archlighting.com/technology/leds-a-deep-dive-in-dimming_o. Accessed: August 5, 2020.
- Tabler, T., J. Moon, and J. Wells. 2019. Why poultry growers have issues dimming LED lamps. Mississippi State University Extension Service. Publ. No. 3380. August.

The information given here is for educational purposes only. References to commercial products, trade names, or suppliers are made with the understanding that no endorsement is implied and that no discrimination against other products or suppliers is intended.

Publication 3510 (POD-08-20)

By **Tom Tabler**, Extension Professor, **Jonathan Moon**, Poultry Operation Coordinator, and **Jessica Wells**, Assistant Clinical/Extension Professor, Poultry Science.

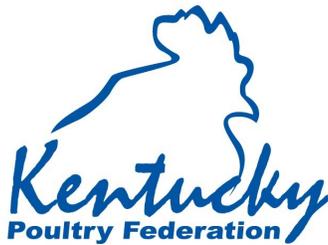


Copyright 2020 by Mississippi State University. All rights reserved. This publication may be copied and distributed without alteration for nonprofit educational purposes provided that credit is given to the Mississippi State University Extension Service.

Produced by Agricultural Communications.

Mississippi State University is an equal opportunity institution. Discrimination in university employment, programs, or activities based on race, color, ethnicity, sex, pregnancy, religion, national origin, disability, age, sexual orientation, genetic information, status as a U.S. veteran, or any other status protected by applicable law is prohibited. Questions about equal opportunity programs or compliance should be directed to the Office of Compliance and Integrity, 56 Morgan Avenue, P.O. 6044, Mississippi State, MS 39762, (662) 325-5839.

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director



2248 University Station
Murray, KY 42071
Phone: 270.404.2277
Email: jguffey@kypoultry.org
www.kypoultry.org



POULTRY INDUSTRY CREATES JOBS IN KENTUCKY

The Kentucky Poultry Federation was organized in 1957 as a civic and educational non-profit corporation. The federation exists for the purpose of fostering, promoting and encouraging the improvement of production and marketing of all types of poultry, poultry products, eggs and egg products in Kentucky.

Kentucky companies that produce and process poultry and eggs are an integral part of the state's economy. Poultry producers along with the companies that provide supplies and materials to the industry provide well-paying jobs in the state and pay significant amounts in taxes to state and federal governments.

Companies that produce and process chicken in Kentucky employ as many as 8,693 people across the state and generate an additional 17,954 jobs in supplier and ancillary industries. These include jobs in companies supplying goods and services to the industry.

These are good jobs paying an average of \$44,500 in wages and benefits. And in today's economy, every job is important. In fact, in Kentucky the unemployment rate has reached 15.4 percent. This means that there are 318,300 people trying to find jobs across the state.

Egg producers in Kentucky employ as many as 771 people across the state and generate an additional 1,576 jobs in supplier and ancillary industries. These include jobs in companies supplying goods and services to the industry. These are good jobs paying an average of \$43,200 in wages and benefits.

The turkey industry in Kentucky employs as many as 1,232 people across the state and generates an additional 2,977 jobs in supplier and ancillary industries. These include jobs in companies supplying goods and services to the industry. These are good jobs paying an average of \$40,500 in wages and benefits.

What do you want to read about?

We want to know what you want to read about. Please e-mail topics of interest to Jacquie.jacob@uky.edu