



## Independent Testing of LED Lights in Broiler Houses

Energy usage savings is significant with NGI AgLED lights, and data indicates bird performance results that are similar to or better than data from birds grown under Compact Fluorescent/ Cold Cathode or incandescent bulbs.

### Overview:

The following was written by Next Gen Illumination, Inc. This review is based on data compiled during independent testing of the \*NGI AgLED in broiler houses.

\*(NGI AgLED - NextGen Illumination, Inc. Agriculture Light Emitting Diode Lamp)

Baseline energy and bird performance data relating to overall house performance is cited directly from the test data collected. Certain assumptions were made and indicated to formulate the projections.

The tests were conducted and data collected in four separate broiler houses on one farm. The period covered in this review includes data from 3 consecutive flock cycles (flock #1 and #2 and #3). In each flock cycle two of the houses were fitted with NGI AgLED lamps. The other two houses were each fitted with CFL, cold cathode, or incandescent bulbs. Each house was separately monitored for energy usage, bird weight, feed intake, and food conversion.

\*Results described in this review are exciting, and those in the poultry industry should take notice. Any conclusions are based on the data from the tests. Whereas expected kWh energy savings are verifiable and predictable, any references to bird performance are projections based on the data included in this review.



### Energy

Energy usage with NGI AgLED provided an 82.4% savings in kWh vs. incandescent.

The following chart shows the results from flock #2. It compares the specific energy usage between two different types of lights in two of the poultry houses on the farm. One house was fitted with 75-67 watt incandescent lamps, a second house with 75 NGI AgLED 10 watt dimmable bulbs. For this flock cycle each house was also monitored by Ozarks Electric Cooperative Utility Company to gauge peak demand savings between the various lighting types. The flock cycle for #2 was 43 days. The following is the lighting energy usage data.

Flock #2	kWh	Lighting Energy Cost per Flock @\$0.10 kWh	Savings of NGI AgLED house vs. Incandescent house per flock	Projected Savings of NGI AgLED house vs. Incandescent house assuming annually (6flocks)
Incandescent house (75 lights)	*1991	\$199.10	0	0
LED 1 house (75lights)	*352	\$35.20	\$163.90	\$983.40

\*This information is baseline data from the test all other information is calculated from this. A rate of \$0.10 was used to reflect average USA per kWh rates.

The above information is consistent with published information provided by the United States Department of Agriculture Energy Estimator which also demonstrates that LED is the most energy efficient lighting for poultry broiler houses. There are normally 6 flocks per year in an average house on a farm. Based on the above information, the Incandescent house compared to LED 1 house showed a direct energy savings on this particular farm of \$983.40 per house per year.

The results from Arkansas-based Ozarks Electric Cooperative monitoring of lighting energy usage during the tests averaged 1.6 KW of peak demand will be saved vs. incandescent\* per house when converting to NGI AgLED.

\*per house generalization is used throughout this review to identify with an average poultry house (test houses) that is 40 ft by 400 ft. USDA uses an average house size of 40ft by 500ft.

NGI AgLED will save the average grower \$983.40 annually in lighting energy cost per house.

**The following chart provides relative savings at various energy rates around the country today and/or as a model of future savings as energy rates increase.**

PER kWh Rate	Flock kWh	Annual kWh usage assuming 6 flocks per year(x6)	Annual kWh Savings	Annual Dollar Savings of Energy Spend using NGI AgLED vs. 67watt Incandescent at various energy rates based on data provided by the testing				
				0.06	0.07	0.085	0.10	0.12
Incandescent	1,991	11946	0					
LED 1	352	2112	9,834	\$590.04	\$688.38	\$835.89	\$983.40	\$1,180.08

Many integrators and individual growers lighting and lighting schedules vary. Providing an energy savings estimate requires the following information: the type of lighting currently being used, the number of each light, lighting schedule, and energy rate. Having this information and being able to verify it through energy bills or monitoring would provide sufficient data to extend a guarantee of the savings amount by converting to the AgLED.

### Bird Performance

The houses fitted with the NGI AgLED produced an average of 8.52% increase in payout check vs. any other house using other lighting sources. Financial success of the farm (or house) is determined by the cost to operate and by the performance of the birds. In simple terms bird performance is expressed as the total weight of the birds at pick up in relation to the amount of feed (conversion) used to grow that weight of bird. Payout or paycheck amount the grower receives after flock pickup is normally indicative of overall bird performance.

Paycheck-Four houses were used in the test. Two houses used NGI AgLEDs. During each flock a variety of other lighting (cold cathode, CFL-compact fluorescent lights, incandescent) were used in the other two houses. In all cases, the two houses fitted with NGI AgLED provided larger payout checks than the houses that were fitted with other type of lighting. See Data and Paycheck chart details below.

Paycheck								
FLOCK Number	LED1	LED 2	HOUSE 3(various other light bulbs)	House 4(various other light bulbs)	Total of LED 1 & LED 2 house combined	Total of House 3 and house 4 combined	Additional income of two combined houses that were fitted with NGI AgLED	% increase in 2 houses combined that were fitted with NGI AgLED
#1	*\$7,109.00	*\$6,280.00	*\$6,170.00	*\$5,522.00	\$13,389.00	\$11,692.00	\$1,697.00	14.51%
#2	*\$7,236.00	*\$7,469.00	*\$6,946.00	*\$7,136.00	\$14,705.00	\$14,082.00	\$623.00	4.42%
#3	*\$6,991.00	*\$6,741.00	*\$6,200.00	*\$6,569.00	\$13,732.00	\$12,769.00	\$963.00	7.54%
Total	\$21,336.00	\$20,490.00	\$19,316.00	\$19,227.00	\$41,826.00	\$38,543.00	\$3,283.00	8.52%

\*base line data from testing. Comparisons of payout check for each set of houses (the lowest control house vs. lowest LED house) & (highest control house vs. highest LED house) within each flock were as follows (numbers reflected as a percent indicated the percent improvement of the LED house vs. other houses): #1-13.7% and 15.2%, #2- 4.2% and 7.5%, #3- 8.7% and 6.4%. While comparing the highest payout check of the “other bulb house” vs. the lowest LED house within each flock results are as follows: #1- 1.8%, #2- 1.4%, #3- 2.6%. Lastly in comparing the lowest payout check of the “other bulb house” vs. the highest LED house the results are as follows: #1- 28.7%, #2- 7.5%, #3- 12.8%. The range of the comparisons of payout check improvement of LED house vs. other lighting house in sequential order is as follows: 1.4%, 1.8%, 2.6%, 4.2%, 6.4%, 7.5%, 7.5%, 8.7%, 12.8%, 13.7%, 15.2%, 28.7%. In all side by side comparisons the houses with other bulbs payout checks were less than any of the LED houses. Although this was a test to capture data on performance of birds with lighting in various control situations, there may be variables not directly relating to lighting in each house or flock that create some margin of error in the results. These interpretations of the data may not be indicative of future results and do not constitute a guarantee that future payout checks will be higher by converting to the AgLED.

In either case the data should raise some questions about the impact of existing lighting that is being used in poultry houses and strong interest in pursuing broad demonstrations of the AgLED in their own operations.

### Overall Impact of NGI AgLED:

\*Converting to NGI AgLED can add \$4,366.40 to the bottom line in an average house per year based on the data

Average House fitted with NGI AgLED				
Per House	Annual income change	3 year cumulative income change	7 year cumulative income change	Payback Months
Annual Energy Savings (.10 cents per kWh)in house with NGI AgLED	\$983.40	\$2,950.20	\$6,883.80	
Replacement cost savings (not including labor and disposal fee)	\$100.00	\$300.00	\$700.00	
Additional payout/paycheck in house with NGI AgLED	\$3,283.00	\$9,849.00	\$22,981.00	
Total Per Year Additional Income in house with NGI AgLED	\$4,366.40	\$13,099.20	\$30,564.80	8.24

\*Data from this review was used in these calculations (6 flocks' w/NGI AgLED vs. 6 flocks w/ other lights). Actual bird performance, energy savings, payouts and ROI may vary depending on specific physical and operational factors at the individual house and farm level.

### Return on Investment:

Based on the above conclusions in this review an average grower (per house) could save and earn an additional \$30,564.80 over the next 7 years as a result of converting to the NGI AgLED (less the original investment). The data in this review indicates that houses fitted with the NGI AgLED have provided more energy savings and better bird performance for every flock discussed. Lighting is critical to bird performance. Not all lighting or light bulbs are created equal. The NGI AgLED is unique in that it has been tested and the results have been documented.

NGI AgLED is designed specifically for the poultry broiler operation

The NGI AgLED is considered a piece of equipment; it will last a minimum of 35,000 hours at full power. It is made of sturdy cast aluminum housing. It is dust proof and will not break or shatter. The NGI AgLED contains no mercury, no lead, and is completely recyclable. In the average grow out light socket the AgLED will last between 7 -10 years and in brood socket well beyond 15 years.

The NGI AgLED is specifically designed to perform in broiler operations, and enhance operational efficiencies by incorporating good color temperature, light distribution, wattage, lux, and other proprietary specifications.

Note: It is important to note that the delivery of the light with the NGI LED (and all LED) varies from how all other more familiar type lights deliver it. The NGI LED directs the light at 120degrees whereas the more familiar incandescent (or cfl) would be at 360 degrees. For most producers/integrators that have been accustomed to this 360 degree light, the visual of seeing a directed LED will be different. In some cases the tech and producer may not like it or better put, aren't used to it, however through extensive real live testing in over 25 flocks around the country over the last 14 months the performance of the houses with NGI LED have been equal to or better than the houses with incandescent. This has been demonstrated consistently in houses from several integrators, on several farms throughout the country. It can be surmised that the NGI LED quality of light, the color, the life and the direction are all components in both the savings in energy, labor, and costs in addition to the overall performance. It is important in the overall design of the NGI LED to maximize bird performance while not wasting lumens and wattage. The results are clear that there is not any detrimental effect on bird performance.

It may also be important to note that any electronic lamp including LED or CFL will require a phantom load in the dimming circuit. This can be overcome by installing a single low wattage incandescent in the circuit somewhere in the line.

The NGI AgLED is an investment. Unlike any other lighting used in poultry houses today, the NGI AgLED is not a consumable. As equipment it can be depreciated; it also generates a return on investment of 2 to 4 times its initial investment cost in just the energy savings. The average grower will save over \$80.00 dollars per month (based on the data in this review) in energy (vs. incandescent), the time and labor of changing lamps constantly, and will not need to consider any potential issues with clean-up, disposal, or fees associated with mercury containing bulbs.

### **Summary:**

The data from this testing clearly demonstrate that the NGI AgLED will save energy usage and spend vs. incandescent. This data also suggests that bird performance may be better compared to any other light in broiler production.

Today there are many choices in lights and each may have subtle differences, many of which can only be seen through the eyes of the birds, thereby affecting performance. Today in business, ROI (Return on Investment) and SRI (Socially/Sustainable Responsible Investing) are two very important components for healthy financials in defining the best investment options for a business. Often times this may only be seen through the bird's eye view and vision of the CEO.

Consideration should be given to the overall financials and benefits of lighting which includes the initial investment, the energy use/ labor/replacement and disposal savings, bird performance and payout, ROI, sustainability, waste stream reduction, environmental footprint, carbon credits(?), public relations, competitiveness and food safety.

### **Conclusion:**

Based on this review the NGI AgLED in the average broiler house can have a significant, predictable and definitive ROI. The NGI AgLED will provide lasting benefits that are good for business and the best choice for the environment.

The results concluded in this review have demonstrated that the NGI AgLED works. Broad market demonstrations and adoption of the NGI AgLED are clearly warranted.

The benefits of using the NGI AgLED will revolutionize the way the Poultry Industry sees light.

An investment in NGI AG LED costs nothing in financial terms, and with financing, provides positive cash flow immediately. The results on direct payback are indisputable regarding energy, labor and replacement costs and although bird performance results have been favorable with the NGI LED... actual size may vary.

The base line testing has concluded that the NGI LED will provide at least equal bird performance to incandescent in a variety of conditions, lighting schedules, and bird types. It is well past the experimental stage and will require producers/integrators to look beyond the visual of the light to the end results that the light produces.

It is certain that NGI LED will continue to evolve in order to make the light even better (through the eyes and performance of the birds), and to enhance, even more, the profit of the producer.