

# Poultry Case Study

Poultry accounts for approximately 40% of total agricultural sales in Maryland, with annual sales from more than 1,600 poultry operations reaching almost \$1 billion<sup>1</sup>. Since the cost of the product from these farms is fixed by the poultry integrator, increasing profit is a function of decreasing costs. The energy required to heat, cool, ventilate and light the poultry houses to support the birds' optimal growth represents a large percentage of a poultry operation's cost. Energy efficiency is thus an essential way to reduce costs and increase profit to stay competitive in this important agricultural sector.

Through the 2014 Kathleen A.P. Mathias Agriculture Energy Efficiency Program, several Maryland farmers implemented the following energy-saving measures for poultry houses:

- Insulated Brood Curtains
- Ceiling and Sidewall Insulation
- LED Lighting
- Ventilation
- Radiant Heaters



**Insulated Brood Curtains** are used to split the house during the brood period, typically the first 7 to 10 days that the chicks are in the house. During this period the chicks must be warmed to 90 to 95 degrees Fahrenheit. As the chicks are smaller during this period, they require less total space. The brood curtain allows the producer to heat only the portion of the house the chicks occupy, creating a heat resistive wall to avoid heat waste in the empty portion of the house. An insulated curtain increases the resistance to heat transfer to empty sections of the house, which decreases heat waste compared to uninsulated curtains.



**Ceiling and Sidewall Insulation** increases the resistive barrier, which prevents heat transfer and allows for more controlled temperatures. Young birds require very warm temperatures and more mature birds can easily overheat, so temperature control is key. Ceiling and sidewall insulation as well as covers on exhaust fans, vent boxes and tunnel doors help to keep heat in, which reduces fuel use in cold weather and during the brood period. Additionally, this insulation and equipment reduces the amount of heat entering the house during warmer months when the birds are older. Insulating areas that have no insulation or reinsulating areas where the existing material has degraded helps reduce heating fuel as well as electricity used for ventilation.

Five farms received grants totaling \$235,082 toward total project costs of \$481,379. Projects were installed during the summer and fall of 2014.

Many poultry farms can benefit from similar energy efficiency projects. Even without the grant, these upgrades pay for themselves in an average of about 9.4 years.



**LED Lighting** is the new industry gold standard for several reasons. LEDs are significantly more efficient than standard incandescent bulbs and CFLs, using 30 to 90 percent less energy than the alternatives. They are dimmable and can provide ideal wavelengths for the birds' health, nutrition and growth rates. LEDs also have the longest estimated lifespan in the harsh environment of a poultry house.



**Ventilation** is a necessary component in any poultry house. It removes ammonia, a component of the poultry manure. It also helps cool the house, as the birds require cooler temperatures when older to avoid heat stress. Because of the dual purpose of exhaust fans, they typically run the entire time birds are in the house. With this high run time, an efficient fan makes a large difference in energy usage and can also decrease demand, an important factor on hot summer days.



**Radiant Heaters** heat objects directly, as opposed to forced hot air heaters which heat the air in the poultry house. As stale air is moved out and fresh air is moved into the house, the heat produced by forced hot air is constantly being removed and the air must then be re-heated. Because radiant heaters heat objects, the heat remains in the building. They reduce fuel use by about 15%.

The following table summarizes the savings and costs associated with these upgrades. Costs and paybacks for similar measures on other farms will vary.

Recommended Poultry Measures	Electric Savings (kWh)	Propane Savings (gal)	Overall Energy Savings (MMBtu)	Estimated Annual Energy	Installed Cost	Estimated Payback in Years
LED Lighting	190,943		651	\$22,962	\$38,876	1.7
Brood Curtains		656	60	\$1,011	\$14,782	14.6
Insulation (Ceiling and Sidewall)		11,823	1,083	\$18,308	\$307,422	16.8
Ventilation and Cooling	17,878		61	\$2,199	\$10,700	4.9
Radiant Heaters		4,137	379	\$6,845	\$109,600	16.0
<b>Totals</b>	<b>208,821</b>	<b>16,616</b>	<b>2,235</b>	<b>\$51,325</b>	<b>\$481,379</b>	<b>9.4</b>

The poultry house upgrades delivered an annual electricity savings of 208,821 kWh – enough to power 16 Maryland homes for a year<sup>2</sup>. The upgrades also provide an annual propane savings of 16,616 gallons—enough to provide a year of heat to 33 Maryland homes<sup>3</sup>.

<sup>1</sup> United States Department of Agriculture (USDA) (2012). Census Publication – Ranking of Market Value of Ag Products Sold. Available online: [http://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/Rankings\\_of\\_Market\\_Value/Maryland/](http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Rankings_of_Market_Value/Maryland/) Accessed: 2/19/15

<sup>2</sup> Based on a 12,360 kWh per year electricity requirement per home.

<sup>3</sup> Based on a 500 gallons per year heating requirement per home.