

AHPHARMA

A Poultry Farm Case Study

Mathias Ag Program

AHPharma is an agricultural product development company. When its president, James McNaughton, learned of an innovative poultry house heating system that draws heat from poultry litter instead of using propane, he was intrigued. Using waste heat to fulfill a vital need on poultry farms meets AHPharma's purpose of providing unique services and products to the food animal industry.

The farm spends a little over \$20,000 annually on electricity and propane costs to heat two poultry houses. While the potential to slash his propane costs with a poultry litter heating system caught his eye, James also knew there was potential for other energy savings. The Kathleen A.P. Mathias Agriculture Energy Efficiency Program provided the farm with an energy analysis to quantify the energy and cost savings from the heating system as well as desired lighting and brood curtain upgrades. The new heating system and other measures are estimated to save 87% of propane heating costs on the farm.

Chicken heating system transports thermal heat drawn from the breakdown of poultry litter through microbial action to the poultry houses using a heat pump system and thermal piping.



LED bulbs are dimmable and use only about 15% of the energy of incandescent bulbs. They also last much longer than any other current lighting option. AHPharma is using two different types of LED bulbs in a comparison study to measure any difference in the health and growth of the brood.



Insulated brood curtains reduce heating requirements by minimizing the heated area of the house when birds are small. Using an insulated brood curtain decreases the amount of energy lost in heating the area.



These energy efficient improvements will save the farm over \$7,000 in energy costs each year and will help reduce fossil fuel consumption (see Table 1). The new heating system will help make the farm more sustainable by generating its own energy rather than relying on fossil fuels. In addition to capturing waste heat, the system captures the ammonia from litter that would otherwise be released into the atmosphere.

Table 1: Implemented Efficiency Measures and Associated Savings

Recommended Measure	Electric Savings (kWh) (Increase ¹)	Propane Savings (gal)	Estimated Annual Energy Cost Savings	Installed Cost	Estimated Payback in Years
Chicken Heating System Install heat pump system with three 5-ton compressors with compressed heat recovery to serve both houses. The system will derive heat from the litter through microbial action and transport thermal heat to the poultry houses using a pumping system and thermal piping. Install four 1 HP, 120 V water pumps with variable frequency drive wet rotor circulators. Install 2 air handling units with an air flow capacity of 400 CFM each.	-31,800	1,630	\$4,274	\$153,489	35.9
Lighting Replace (96) 100 watt incandescent bulbs with (96) 12 watt dimmable light emitting diode (LED) bulbs per house. Install 1 LED specific dimmer per house. The LED bulbs will meet the needs of the birds as confirmed by the producer and integrator. The bulbs are between 3000-6500 K color temperature and have a minimum color rendering index of 73.	20,022		\$2,505	\$4,478	1.8
Insulated Brood Curtains Replace (2) existing uninsulated brood curtains per house with (2) insulated brood curtains per house. Insulated brood curtains have a minimum R-value of R-2.5.		47	\$239	\$5,546	23.2
Totals	(11,778)	1,677	\$7,018	\$163,513	23.3

James completed the installation of his poultry litter heating system in May 2013 and looks forward to the opportunity to monitor the new measures for effectiveness on not only energy savings but on the brood’s health and productivity. “It’s great to be able to use a waste product on my farm to replace a good part of my heating costs and to switch out my old 100 Watt incandescent lights for new LED lights,” he said. “It is even better to analyze these measures and document their savings and effectiveness in a model poultry house to help other farmers have a clear understanding of what implementing these and other measures will mean to their farms.”

As one of the first farms in the Delmarva area (i.e., Delaware-Maryland-Virginia) to implement this new heating system, AHPharma is demonstrating the potential of new energy technologies. It is working closely with the University of Maryland Eastern Shore to monitor the farm’s chicken heating system and LED lights to document the energy savings over time and their effect on brood health and productivity. Having access to the costs and savings associated with these new technologies is key to helping farmers make better-informed cost/benefit decisions.

¹ The electricity consumption increases because the old propane fired heaters did not require electricity while the new chicken heating system requires pumps to move the heat from the litter to the poultry houses. Overall, the project is anticipated to reduce energy consumption by 113.4 MMBTUs annually.

