CAPRIKORN FARMS

A Dairy Farm Case Study

Mathias Ag Program

Maryland Energy ADMINISTRATION
Powering Maryland's Future

Caprikorn Farms is a small goat dairy in Gapland, Maryland, part of a growing movement of small-scale livestock production. In addition to raising and selling goats, the farm makes its own cheese that is sold locally. Owner Alice Orzechowski inherited the 1950's era milk house in 2005 and wanted to make energy efficiency improvements to bring it into the 21st century.

The farm spends about $6,200 each year to milk 72 goats. This energy expense represents a significant drain on the farm's bottom line. Alice knew that she could slash her dairy's energy expenses. An energy audit provided through the Kathleen A.P. Mathias Agriculture Energy Efficiency Program gave her solid information about how much energy she could save, and program grant funds helped her implement the planned measures.

Geothermal stock waterers replace conventional electrically powered stock waterers. In cold weather, livestock farmers use stock waterers to prevent the animals' drinking water from freezing. This device requires no electricity and has an ancillary effect of cooling the water in the summer.

Compact fluorescent lamps (CFLs) deliver the same amount of light as incandescent bulbs but use only ¼ of the electricity. They also last up to 10 times longer than incandescent bulbs.

Air-source heat pump water heaters use a heat pump to extract heat from the ambient air to supplement the traditional heating element in the water heater. The farm placed its water heater near the milk cooling condensers, which generate large amounts of waste heat.

Extruded polystyrene insulation was added to a shed on the south side of the building, which will house the dairy's vacuum pump. The pump was previously housed in an uninsulated area that required an electric space heater, so the move to an insulated space removed the need for external heating.

Together, these measures reduce Caprikorn Farms' energy use by nearly 50%. As shown in Table 1, they have an average payback of 5.1 years. The rapid payback and relatively low cost of these measures make them a good choice for smaller livestock farms, especially ones operating in an older space.

Table 1: Implemented Efficiency Measures and Associated Savings

Recommended Measure	Electric Savings (kWh)	Estimated Annual Energy Cost Savings	Installed Cost	Estimated Payback in Years
Geothermal Stock Waterers Replace (8) 1500 watt stock waterers with (8) solar stock tanks. Solar stock tanks have a solar collector (non-photovoltaic) and a water-holding capacity of approximately 42 gallons. No electric supply is needed for these stock tanks.	14,400	$1,570	$7,536	4.8
Milk Parlor Lighting Replace (19) 100 watt incandescent fixtures with (19) 23 watt compact fluorescent fixtures. The recommendation requires replacing the entire fixture with a new fixture.	3,738	$407	$2,235	5.5
Water Heating in Milk House Replace existing water heater with an air-source heat pump water heater. The water heater will have a capacity of 50 gallons and a minimum ENERGY STAR® energy factor rating of 2.4. Insulate existing compressor housing structure with 2" of extruded polystyrene to capture heat for heat pump water heater.	5,011	$546	$2,959	5.4
Space Heating: Vacuum Pump Room Relocate vacuum pump to the room on the south side of the building and insulate the room with 2" of extruded polystyrene to eliminate the need for the electric space heater.	5,040	$549	$2,956	5.4
Totals	**28,189**	**$3,073**	**$15,686**	**5.1**

Alice installed the equipment in April 2013 and is happy to have her old space brought up to date. "In the small but growing small ruminant livestock industry, I'm glad to set an example for other farms to follow," said Alice.

The energy efficiency projects installed at Caprikorn Farms show that saving energy is not just for large farms. Indeed, the measures are an inspiration to other small-scale or beginning operators who can see the value in making their operation as energy efficient as possible. Caprikorn Farms' investment in energy efficiency shows that smart financial decisions for the business can also benefit the environment.