Farm Energy IQ

Direct Market Poultry Farm—Case Study

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SUMMARY

This farm is a poultry production and processing operation which sells much of its production directly to market. The farm produces a variety of poultry products (meat and eggs) which it sell fresh, frozen, or as part of baked goods and other processed products. Products are sold directly to the customer at an on-site farm market, local farmers markets, through mail order, directly to restaurants and retail outlets, and to other direct marketers of high quality meat products. The operation includes a slaughterhouse and extensive kitchen facilities. The recently-expanded kitchen incorporates many energy efficient technologies. Other parts of the farm include older equipment and structures that may benefit from newer energy efficient systems.

ENERGY PROFILE

This farm has natural gas, which it uses primarily for heating. The electric supply is a mixture of three phase (480V) and single phase (240V) services. The slaughterhouse and kitchen account for most of the energy use. Heating poultry barns uses most of the rest of the natural gas, and lighting the barns is a significant portion of the remaining electric use.

This farm exemplifies many of the energy issues found on direct market farms. Because the operation is relatively small compared to most other poultry farms, it cannot take advantage of some economies of scale, which can be seen in many of the facilities:

- Barns – Ventilation and heating controls are manual, analog, with some redundant sensors. A larger facility could justify the expense of centralized, electronic digital controls. A more sophisticated control system would reduce energy costs, require less labor and improve maintenance. Barns are small, with a higher outside surface-to-floor area ratio than larger structures. This results in greater heat loss and higher energy use associated with heating.
- Slaughterhouse – The scale of this facility and the limited hours of operation don't justify investing in high efficiency equipment for processing and packing.

- Refrigeration – For many reasons, including the range of products produced, the seasonal nature of storage requirements, and the way in which the farm expanded, the farm has many smaller refrigeration units rather than a few large facilities.
- Kitchen – Even though the kitchen includes many energy efficient systems, the use is less intensive than it is in larger kitchens and the overall energy efficiency is lower than it could be in a bigger, more active facility.
- Farm store – The store requires lighting, heating and air conditioning during the hours when it is open to the public. The occupancy is low compared to larger food retail outlets, so the energy use is high for the number of customers served.
- Trucking and delivery – The farm owns several vehicles for transporting products to farmers markets, local restaurants and retail outlets. The small size of the fleet increases maintenance costs and reduces the incentives to purchase vehicles with energy efficient features. The distributed nature of the sales outlets and the timing of the demand make it difficult to optimize distribution routes.

Figure 1. ENERGY STAR ovens

Figure 2. Variable Frequency Drive-Controlled Pump (Photo: USDA)

ENERGY EFFICIENCY OPTIONS

Despite the fact that by its nature the operation has inherent inefficiencies, there are opportunities to reduce energy use. These include:

- Wherever practical, replace incandescent bulbs and older fluorescent fixtures with LED, compact fluorescent (CFL) or high efficiency fluorescent lights. Bulbs for poultry barns may require special considerations because of the potential for breakage, color temperature, and dimming requirements.
- Implement intelligent controls as cost permits.
- Install high efficiency heating equipment for space heating and hot water supply.
- Upgrade to refrigeration equipment with higher efficiencies.
- Purchase appliances for kitchens and elsewhere with ENERGY STAR ratings.
- Use energy recovery systems in commercial range hoods.
- Use variable frequency drive controls with pumps and other large fan motors.
- Contract vehicles and drivers instead of purchasing vehicles to make deliveries.

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Significant efforts have been made to ensure the accuracy of the material in this report, but errors do occasionally occur, and variations in system performance are to be expected from location to location and from year to year.

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