



Minnesota Fact Sheet 374 Farmstead Energy Improvement

Purpose

The purpose of this practice is to implement improvements to reduce or improve energy efficiency of on-farm energy use.

Ventilation

Independent performance testing of fans is provided by the Bioenvironmental and Structural Systems (BESS) Laboratory at the University of Illinois. The website is <http://bess.illinois.edu>.

Exhaust Fans



Exhaust fans are used to pull outside air through a building. They are typically used in tunnel or cross ventilation systems.

Horizontal Air Flow Fans

Circulation fans within the building provide air mixing within a building by establishing a horizontal air circulation pattern within the building.



High Volume Low Speed Fans

HVLS fans are large diameter (typically 10 – 25 foot diameter) circulation fans which move large volumes of air with a low circulation speed.



Dairy Equipment

Plate Cooler



Well water precoolers are heat exchange units that use well water to cool milk before it reaches the bulk tank. The warmed water can be used for livestock watering or washing. Plate coolers can counteract benefits of a compressor heat recovery system because they reduce

the amount of heat that is available for the heat recovery unit to utilize to heat water.

Scroll Compressor

Scroll compressors are utilized in refrigeration systems in dairies and more efficient than older styles of compressors. Replacing a less efficient compressor with a scroll compressor has a potential to reduce milk cooling costs by as much as 20%.



Compressor Heat Recovery



Compressor Heat Recovery units, also called refrigeration heat recovery units, are used to capture waste heat from the milk refrigeration system and utilize it to heat water. The benefits of a compressor heat recovery system can be reduced if used in conjunction with a plate cooler because the amount of waste heat available for use by the heat recovery system is reduced.

Water Heating

Hot water is necessary in dairies for proper sanitation and cleaning of equipment. High efficiency conventional style storage water heaters, heat pump water heaters or tankless (on demand) water heaters can help reduce energy consumption required to heat water to temperatures needed for proper operation of the dairy.

High Efficiency Laundry Equipment

Some dairies include their own laundry facilities to wash towels used to clean sow's udders during milking. High capacity, high efficiency commercial washers conserve energy by reducing power consumption during the wash cycle. Washer-extractor units further reduce energy usage by removing more water from the clean laundry which reduces the amount of energy needed during drying time.

Low Energy Waterers

In northern climates heated livestock waterers are common in facilities with outdoor lots. Energy free or geothermal fountains are designed to utilize heat from the ground as a heat source, eliminating the need to heat the waterers using electricity.

Motors and Controllers

Variable Speed Drive



A variable speed drive varies the speed of an electric motor in order to more closely match demand and reduce energy consumption. They are especially useful on equipment that runs intermittently because they can reduce on/off cycling of the motor which reduces wear on the motor and can extend equipment life.

Besides the energy savings benefit of VSD controllers, another benefit to installing a VSD on a vacuum pump on a milk harvesting systems is that they help to provide more constant pressure through the system which can aid in cow comfort.

Automatic Controller System

Temperature and moisture sensors can be integrated into an automatic controller system to more efficiently regulate systems such as ventilation and heating systems in order to maintain desired environmental conditions in a livestock facility. This helps to ensure that the systems are operated only when needed and reduces energy that is wasted by the system.

Motor Upgrade

Electric motors are used to run various types of equipment in agricultural facilities, including ventilation fans, pumps, and material handling equipment. Replacing older less efficient motors with NEMA premium high efficiency motors can significantly reduce energy consumption.

Heating

Radiant Heaters

Radiant tube heaters act to heat objects and animals in a livestock facility. They provide more efficient heating than forced air heating because heat is transferred directly to the animals rather than being used to heat the air in the building as with forced air heating. Forced air heating is also dependent on proper air circulation in order to distribute the heat throughout the building.



High Efficiency Heaters

Heating agricultural buildings is a significant energy demand for many facilities. Replacing less efficient heating systems with high efficiency heaters reduces the amount of energy to maintain desired temperatures in the building.

Attic Heat Circulation

Attic vents or inlets can be operated in colder weather in order to allow dry warm air from the attic area of buildings to circulate throughout the building. This is often done for air quality reasons, but using warmer air from the attic can also reduce the heating requirements for the building, and improved circulation may reduce loads on ventilation equipment also reducing energy usage.

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