

# Conserve energy in farm shop

**T**HE warm autumn and early harvest has extended the timeline for many building projects this year. If your plans for the farmstead include updating the farm shop or expanding an existing structure, consider the following guidelines for optimal energy efficiency.

The size of a shop heating system depends on the size of the shop, how often



## Farm Energy

By DANA PETERSEN

it's used, and how often large doors will be opened and closed, says Greg Brenneman,

an Iowa State University Extension ag engineer. Forced-air furnaces, infrared heaters and in-floor heating systems are commonly used. Typical heating fuels include propane, wood, fuel oil or waste oil.

"As the weather grows colder, maintaining a minimum shop temperature of approximately 40 degrees Fahrenheit protects shop supplies and equipment from

freezing," he says. It is also easier to warm the space to a comfortable working temperature, typically 55 to 65 degrees.

Brenneman notes that managing forced-air heaters for energy efficiency can be difficult. "Furnaces should be sized at approximately 50 BTU per hour per square foot of shop floor area," he says. Ceiling-mounted, forced-air space heaters prevent hot air from stagnating near the ceiling.

### Choosing a heating system

Power-vented or condensing heaters are more energy-efficient than natural draft heaters. A power-vented heater and a condensing heater are approximately 13% and 25% more efficient, respectively, than a natural draft heater. Unvented liquid propane or LP heaters commonly used in livestock buildings are not recommended for farm shops due to the lack of ventilation and the danger of carbon monoxide poisoning.

In-floor heating systems are best suited for shops that are frequently used during cold weather, notes Brenneman. Floors retain heat for long periods and provide a comfortable working surface. However, these systems are relatively expensive and not ideally suited for occasional use.

Adequate insulation is another key factor for energy efficiency. The building's foundation should be insulated with at least 2 inches of extruded polystyrene insulation with an R-value between R10 to R12. This will reduce heat loss through the floor and keep the floor surface warmer.

Perimeter insulation can be installed underneath the floor for 4 feet around the outside edge or outside of the foundation wall to a depth of 4 feet. For diagrams, download the ISU Farm Energy fact sheet "Conserve Heat Energy in the Farm Shop," PM 2089P, at [farmenergy.exnet.iastate.edu](http://farmenergy.exnet.iastate.edu).

To conserve heat during winter, minimum recommended insulation levels around the shop include an R-value of 10 for shop doors, 15 to 20 in sidewalls, and 30 in ceilings. To protect insulation from moisture, a vapor barrier of 6-mil polyethylene should be installed between the inside wall or ceiling panel and the insulation.

### Doors, windows and lighting

If you're modifying an existing building, large doors for equipment should be located on the south or east side of the farm shop, says Brenneman. "To conserve heat, it's best to avoid prevailing winter winds from the north and west," he says. Windows should also be installed primarily on the south side of the building to capture sunlight during the winter and allow minimal solar gain in the summer. For optimal efficiency, windows in walls and overhead doors should be double-glazed.

If your shop can benefit from small improvements such as energy-efficient lighting, consider LEDs for task lighting or T5 fluorescent fixtures for bench lighting. Check with your local utility providers for potential rebates on insulation, lighting and heating systems for the farm shop.

For more on farm energy efficiency, follow @ISU\_Farm\_Energy on Twitter or bring your questions to the Integrated Crop Management Conference Nov. 28-29 at Iowa State University in Ames. For online registration, visit [www.aep.iastate.edu](http://www.aep.iastate.edu).

Petersen is with ISU Farm Energy.

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