

Profiles in R&D

Applied research and development that serves society – today and tomorrow.

Heat pads confirmed as effective and energy efficient

Interested in the capabilities of heat pads in a full-scale production setting, The Puratone Corporation (Puratone) performed a six-month trial to compare heat pads with traditional heat lamps. The testing at Interlake Weanlings Ltd., a Puratone sow barn located near Arborg, confirmed earlier findings that heat pads are just as effective as heat lamps for raising piglets in farrowing crates.

Heat pads are like waterproof, rigid electric heating blankets that line the creep of each crate. The heat pads used in the project were encapsulated in fiberglass reinforced plastic, while a carbon element located under the upper skin of each pad delivered uniform heat to keep piglets warm.

According to the Puratone Project Management Team, Puratone wanted to confirm the effectiveness of heat pads in full-scale production (rather than a research setting), prior to making the switch throughout their operation. One of the largest swine producers in the province, Puratone continuously seeks innovative ways to improve energy efficiency.

During the six-month trial that began in October 2005, more than 4,700 piglets were raised through five test cycles in two farrowing rooms, each with 44 crates. The control room was equipped with 44 heat lamps, rated at 175 watts, each one serving a single farrowing crate.

The test room used 22 double-sized heat pads, rated at 130 watts, each one



Piglets under heat lamps (left) and on top of heat pads in farrowing crates in a research setup at Interlake Weanlings Ltd. The research set up was designed to compare the effectiveness of the two heating methods.

serving two farrowing crates. The heat pads measured four feet long by two feet wide and were about an inch thick.

Researchers monitored energy consumption, piglet mortality and weight gain, as well as room temperature and humidity.

No significant differences in weight gain or mortality

Average daily weight gain was calculated from the difference between the weight of the litter just after birth and before leaving the farrowing room. The differences in weight gain between the two groups was considered statistically insignificant, as overall weight gain from birth to weaning (at 16 days) for piglets raised with heat

pads averaged 0.25 kilograms/day, compared to 0.23 kilograms/day for piglets raised by heat lamps.

Differences in mortality were also considered statistically insignificant. Mortality was recorded by counting the number of piglets that were born alive but died during their first three weeks in the farrowing room. For piglets raised with heat pads, mortality averaged 10.6 per cent, while piglets raised under heat lamps averaged 10.8 per cent.

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Significant savings

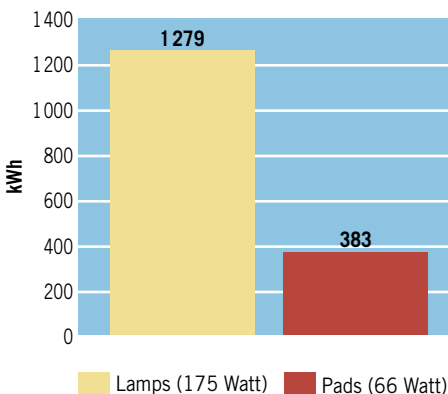
While there were no significant differences in piglet health performance, **heat pads reduced energy consumption by 70 per cent compared with heat lamps.** Heat pads proved to consume less energy, with average monthly demand savings of 117 watts, 75 kWh in electricity, totaling \$43 annually in energy costs (per crate).

Heat pads also consumed only 17 per cent of the electricity needed to operate the farrowing rooms where they were installed, while heat lamps consumed 56 per cent.

Life span is another significant difference between heat pads and heat lamps. The average life of a heat pad is approximately 15 years. Heat lamps, which cost about \$10 each, last 5,000 hours, requiring maintenance and replacement 1.5 times per year (based on usage of 7500 crate hours annually), representing an additional cost of \$15 per heat lamp (excluding labour).

Producers who switch to heat pads can also avoid the cost of replacing worn

Annual energy comparison: Heat pads versus heat lamps



For heat pads, electrical demand was about one-third the amount of the heat lamps, and electrical consumption about one-quarter. The bottom line: Puratone saved approximately \$3 per crate each month in electricity costs with heat pads.



Pulse type load meter. This special meter monitored power consumption in the crates every 15 minutes, for an accurate picture of electrical demand and usage.

out heat lamp sockets, which, following legislation introduced January 2006, require maintenance performed by journeyman electricians.

Given these differences in energy, repair and replacement costs, research has shown that compared with using heat pads, heat lamps cost an additional \$58 per crate per year.

Producers cite benefits

Ray Boris, an agricultural engineer with Manitoba Hydro, says that local swine producers who have switched from heat lamps to heat pads cite numerous benefits in addition to energy savings.

“Producers tell us that under heat lamps the piglets tend to pile up to keep warm. On heat pads, they spread out, resulting in fewer crushing losses.”

Boris says producers can create two environments in farrowing rooms with heat pads — a cooler one for the sows and a warmer one for the piglets.

“As the piglets grow, producers can cut back on heat from the pads. The piglets

start going to the sow more often. The sow responds by eating more and producing more milk to keep up with the piglets.”

Staff also find it easier to clean out crates with a pressure washer because they don’t have to worry about breaking heat lamps.

According to Boris, roughly one-third of swine producers across the province have had substantial energy savings after making the switch to heat pads from heat lamps. “The energy

saved can be exported for revenues that help keep Manitoba Hydro’s rates among the lowest in the industrialized world.”

Testing at Interlake Weanlings Ltd.

was sponsored jointly by The Puratone Corporation and Manitoba Hydro. Dr. Chong Zhang and Dr. Eshetu Beshada, researchers at the University of Manitoba, designed the experimental set-up at the sow barn, and the project was supervised by Dr. Shokry Rashwan, Project Engineer at Puratone. Heat pads were supplied by Alternative Heating Systems Inc.

Heat pads reduced energy consumption by 70 per cent when compared with heat lamps.

Puratone's findings consistent with earlier research

Earlier heat pad studies conducted by the University of Manitoba's Glenlea Research Station and the Agriculture Canada Research Centre in Brandon offered results consistent with Puratone's testing.

Glenlea Research Station

In the Glenlea study, piglets were divided into two groups—those raised on heat pads only and those raised on both heat pads and heat lamps for the first two days after farrowing.

The research, conducted in a farrowing room with 36 crates, measured weight gain and mortality in 170 piglets from six farrowings between fall 2000 and spring 2002. The results showed there were **no significant statistical differences** between the weight gain and mortality of piglets.

For piglets raised on heat pads alone, overall weight gain from birth to weaning averaged 5.69 kilograms

after 28 days. For piglets raised with a combination of heat pads and heat lamps, overall weight gain from birth to weaning averaged 5.78 kilograms after 28 days.

By the time the piglets were weaned, the total number of deaths averaged 24 for piglets raised on heat pads, and 28 for those raised with heat pads and heat lamps.

Study findings also showed that the heat pads helped dry birth fluid from newborn piglets. When birth fluid rubbed off onto a heat pad, it readily evaporated.

Agriculture Canada Research Centre

A research study conducted at the Agriculture Canada Research Centre in Brandon followed piglets through three farrowing seasons, from birth to weaning at 28 days. Results showed



Farrowing crate at the University of Manitoba's Glenlea Research Station. The heat lamp is turned off.

that keeping newborn piglets warm in swine farrowing facilities with either heat pads alone or heat lamps alone **made no difference** in weight gain or mortality.



Heat pads form a warm surface and provide piglets with a large area of comfort.



Piglets show a preference for the comfort and warmth of heat pads.

PROJECT PARTICIPANTS

Project funding provided by:

- Manitoba Hydro
- The Puratone Corporation
- Alternative Heating Systems Inc.

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