KNOW THE TEMPERATURE REQUIREMENTS OF YOUR PIGS

Just as we feel colder on a windy or humid day, pigs experience the temperature of their environment differently based on different factors. There is a difference between the room temperature and the effective environmental temperature for the pigs (the 'feels-like' temperature). For this reason, temperature requirements for pigs depend on many factors such as air temperature, air movement, humidity, flooring material, bedding/dryness (of the floor), age and size of the pigs, group size, feed type and intake level, and health status. The aim of temperature control in the barn is to keep pigs in their thermoneutral zone. This is the temperature range in which an animal is comfortable, having neither to generate extra heat to keep warm nor expend metabolic energy on cooling mechanisms such as panting. The bottom temperature of the thermoneutral zone is the lower critical temperature, whereas the upper temperature of the thermoneutral zone is the upper critical temperature.

Table 3 provides the optimum temperatures and desirable limits for pigs of all ages as measured at pig level. Producers should try to keep the temperature within these limits by using heat sources in the colder months, and by increasing ventilation in the warmer months.

When temperature falls below the lower critical temperature, pig heat production increases 2-4% per °C. Cold pigs will huddle and lie with minimal body contact to the floor and piglets will shiver. Both shivering and heat production take energy that the pig cannot use towards growth; this results in reduced feed efficiency along with increased susceptibility to disease.

When temperature gets above the upper critical temperature, pigs need to use energy to cool down. Hot pigs will separate from one another and seek out wet parts of the pen - when pigs are warm, they eat less, and growth performance suffers. Keeping a room too hot also wastes energy, increasing energy costs and reducing performance, temperature control is therefore important. Table 4 shows the recommended setpoint temperatures during the heating season for various ages of pigs.

Pigs prefer a diurnal pattern for environmental temperature with a preference for higher temperatures during the day when active, and lower temperatures at night taking advantage of

Table 3. Recommended light levels and photoperiods for pig barns.

Category	Optimum Temperature* °C (°F)	Optimum °C (°F)
Creep area - newborn piglets	35 (95)	32-38 (89-100)
Creep area - older piglets *(2-5 kg [4-11 lbs])*	30 (85)	27-32 (81-89)
Young pigs *(4-5 days post weaning)*	30 (85)	33-37 (91-99)
Young pigs *(5-20 kg [11-44 lbs]) in weaned pens*	27 (80)	24-30 (75-86)
Growing pigs *(20-55 kg [44-121 lbs])*	21(79)	16-27 (61-81)
Finishing pigs	18 (65)	10-24 (50-75)
Gestating sows	18 (65)	10-27 (50-81)
Lactating sows	18 (65)	13-27 (55-81)
Boars	18 (65)	10-27 (50-81)

** Stated temperatures reflect the desired temperatures in the environment directly surrounding the pig, and not necessarily the overall temperature of the barn. Supplementary heat sources (e.g. heat mats) can be used to achieve desired temperatures.*

Pigs within their thermoneutral zone sleep side by side without huddling and without moving away from each other

Table 4. Recommended setpoint temperatures (°C) for various ages of pigs (heating season)

Room and body weight (kg)	Solid floor	Slatted floor	Solid floor with straw
Gestation	17	19	15
Lactation	16	18	14
Nursery			
7 kg	26	28	25
20 kg	23	24	22
Grower/Finisher (all in/all out)			
25-50 kg	21-15	23-15	20-14
55-90	14	15	13-10

huddling while sleeping. Research at the University of Minnesota showed that it is possible to drop the nighttime temperature after day five in the nursery room by 8.3°C without affecting growth performance.

This resulted in a 30% and 20% savings in heating fuel and electricity use, respectively. Research at PSC showed that when given a choice, early-weaned piglets chose warmer temperatures during the day and lower temperatures at night. Another trial showed that grow-finish pigs could handle daily temperature fluctuations up to 13°C without affecting growth performance as long as this fluctuation is through a slow and steady change and mean daily temperature is within the optimal range. These trials show that there are opportunities to reduce energy use by reducing the temperature setpoints at night below the optimal or desirable temperatures for nursery and grow-finish pigs. It is very important to ensure there are no abrupt temperature fluctuations.

> "There are opportunities to reduce energy use by reducing the temperature setpoints at night below the optimal or desirable temperatures for nursery and grow-finish pigs."

Research at Prairie Swine Centre has also shown that group-housed gestating sows can handle lower temperatures than the recommended temperature setpoint of 17°C. When sows were given an option to control room temperature, group-housed gestating sows tended to maintain the room temperature at around 12.7°C when fed a standard diet and at around 11.9°C when fed a high fibre diet. This resulted in approximately a 75% and 11% reduction in natural gas and electrical consumption (during the heating season) respectively, when compared to rooms with pre- set temperature of 16.5°C, and translated to a reduction in facility costs of $2.80 per market hog.

This research suggests that it is safe to reduce the room temperature for group-housed gestating sows. It also shows diet type can have an impact on the preferred temperature of pigs, with high fibre diets reducing ideal room temperature. This is

Group-housed gestating sows can handle lower temperatures than the recommended temperature setpoint of 17°C.

because dietary fibre has a high heat increment, meaning that it produces more heat inside the animal's body than other types of feed. As a result, the animal does not feel cold as quickly. Increasing dietary fibre in gestating sow diets only makes sense when the increase in the cost of these diets is lower than the savings in energy reduction through the slightly lower room temperature requirement.

Besides diet type, feeding level is also relevant, as full fed animals can withstand colder temperatures. Table 5 shows the tremendous drop in the lower critical temperature when growing pigs increased their feed intake. In other words, producers can decide to increase or decrease feed or fuel to maximize net returns.

Table 5. Relation between body weight, feed intake, and lower critical temperature in groups of growing pigs at normal levels of feeding (Source: Canadian Farm Buildings Handbook).

body weight (kg)	Feed intake 0.5	1	1.5	2	2.5	3
	Lower critical temperature (C)					
20	21	14				
40		20	14	8		
60			18	16	8	
80			16	11	7	
100			18	13	9	
120				15	11	8

What's the cost?

Let's consider a 200 head grow-finish room. The winter temperature recommendations are 21°C for 25-kg pigs reduced to 15°C for 75-kg pigs. Let's consider three temperature scenarios within this room and the impact that it has on energy costs.

- Scenario 1 — 21°C-15°C = represents the correct temperature recommendations.
- Scenario 2 — 21°C-18°C = temperature is maintained at 21°C until pigs are 50 kg and reduced to 18°C for 75-kg pigs and stays constant until animals reach their market weight.
- Scenario 3 — 21°C = maintains pigs at 21°C throughout the full production cycle.

Saskatoon and Winnipeg are the two locations chosen for this example. Calculations use monthly average temperatures over a 30-year period with a prairie energy cost of $0.031/kWh. Winnipeg had lower average temperatures than did Saskatoon.

The following values look only at the heating costs to maintain the desired temperatures and do not consider the energy costs of ventilation. The carbon tax is not part of the calculation.

Saskatoon

The cost to maintain the recommended temperature (21°C-15°C) would be $162.01/yr. Moving to the 21°C-18°C and 21°C temperature scenarios represents an additional $90.40/yr and $226.43/yr increase in heating costs, respectively.

Winnipeg

It would cost $179.10/yr in heating to maintain the recommended setpoint temperature of 21°C-15°C. Moving to the 21°C-18°C and 21°C temperature scenarios again would represent a large increase in the heating bill: an additional $88.65/yr for the 21°C-18°C scenario and $222.23/yr for the 21°C scenario.