

Avoiding Production Losses in Swine Due to Heat Stress

J. Smith and L. Eastwood

INTRODUCTION

Long, hot, humid summer days can result in heat stress in pig operations. Determining the economic loss associated with heat stress is difficult as it impacts performance at all levels of production, including the sow herd and growing pigs. It has been estimated that heat stress costs the U.S. swine industry \$300 million to \$450 million annually [1].

Although pigs are generally raised in facilities with a controlled environment, it is not always possible to avoid high temperatures within the barns. Temperatures above 23°C can have negative impacts on animal performance. In extreme cases, heat stress in pigs can lead to death loss. For both animal welfare and business reasons, it makes sense to take measures to reduce the impact of hot weather on pigs.

WHEN AND HOW DOES HEAT STRESS OCCUR?

Heat stress occurs when the environmental temperature rises to a point where the animal is producing more heat from metabolism, or receiving more heat from its surroundings, than it is transferring from its body to its environment.

Heat stress is a concern with pigs because they do not have functional sweat glands to help them reduce body heat. They lose heat to their surrounding environment by conduction, thermal radiation, convection and evaporation to maintain their ideal core body temperature. If temperature and relative humidity are too high, pigs can no longer maintain their ideal body temperature.

Figure 1 shows a Heat Stress Index for grow-finish pigs, determined by temperature and relative humidity, that can be used to assess the risk to animals under various conditions.

Room temp.	Relative humidity												
	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
35°C	Heat stress emergency												
34°C													
33°C	Heat stress emergency												
32°C													
31°C	Heat stress emergency												
30°C													
29°C	Heat stress danger												
28°C													
27°C	Heat stress danger												
26°C													
25°C	Heat stress alert												
24°C													
23°C	No heat stress												
22°C													
21°C	No heat stress												

Figure 1. Heat stress index for grow-finish pigs. Adapted from H. Xin and J. Harmon. 1998.

Under heat stress conditions, the goal is to minimize heat transfer to the animal from the surroundings and maximize heat transfer from the animal to its environment. Recognizing the potential for heat stress, or that pigs are experiencing heat stress, is the first step in helping the animals cope with a hot, humid environment.

SIGNS OF HEAT STRESS

- evident discomfort or distress: pigs lying apart, body stretched out
- manure patterns change: pen floors become wet and unclean
- increased water consumption
- noticeable decrease in pen activity: slowness and lethargy
- muscle trembling
- rapid fall in feed consumption with reduced weight gains
- very high respiration rate (panting)

COPING WITH HEAT STRESS

Pigs will try to increase heat dissipation and decrease body heat production. To support this:

- Make sure pigs have unrestricted access to a good supply of clean drinking water.
- Install a timed water sprinkler or mister system triggered by room temperature for group-housed pigs (sows, grow-finish). Sprinklers should activate for 1–2 min. every 20–30 min. to allow moisture to evaporate from the pigs’ skin before starting the process again. Larger water droplets work better than a fine mist.
- Install a drip cooling system or sow cooling pads for individually housed sows.
- Ensure proper ventilation rates for the size of room and the weight of the pigs (Table 1).
- Do not overcrowd pigs. Provide enough pen space so that all the pigs can lie down without touching each other and still access feeders, waterers and the dunging area without stepping on pen mates.
- Work with your nutritionist to reformulate more nutrient-dense diets during hot weather.
- When pigs are fed at set time points, alter the time of day in which the bulk of feed is offered. Providing the majority of feed during cooler hours will help reduce decreases in feed intake.

Table 1. OMAFRA ventilation rate guidelines

Type of Animal	Ventilation Rate per Animal	
	Cold Weather	Warm Weather ^a
Breeding/gestating sow	10 CFM	200 CFM
Farrowing sow with litter	15 CFM	400 CFM
Nursery pigs, 4–25 kg	1.0–3.0 ^b CFM	15–35 ^c CFM
Grower pigs, 25–60 kg	4.0–6.0 CFM	50–70 CFM
Finishing pigs, 60–120 kg	6.0–8.0 CFM	70–90 CFM

^a Summer ventilation rate for large pigs may have to be increased to 1 air change/min. during hot summer weather.

^b For reasonably good air quality, this minimum winter ventilation rate may have to be increased to ensure at least 3–4 room air changes/hr.

^c Limit the maximum number of summer air changes to 1/min. for sensitive livestock.

Source: *Ventilation for Livestock and Poultry Facilities*, Pub 833, OMAFRA.

It is important to recognize when temperature and humidity can increase the risk of heat stress in pigs. By recognizing when pigs are experiencing heat stress, and knowing how to help them cope, we can prevent or reduce production losses during periods of hot weather.

BE PREPARED

The weather cannot be controlled. Plan ahead and have strategies in place to deal with hot weather when it happens.

Death loss due to heat stress is most often attributed to power outages in hog barns when there is no alternate power source or power loss back-up plan. Test your alternate power generation and power outage alarms monthly for fan-operated barns. Check panic doors/drop curtain releases for naturally ventilated barns. Heat build-up in non-ventilated barns can cause fatalities in all seasons.

TRANSPORTATION

Transport during any season can cause heat stress in pigs and may result in death loss. Producers can mitigate this in the following ways:

- Load animals in groups of less than five.
- Adjust transport to early morning or at night during the summer.
- Load fewer pigs per load on hot, humid days, following Ontario Pork's *Loading Density Guidelines*.
- Provide wet shavings when the temperature is over 15°C; do not use straw.
- Mist or spray pigs with water prior to loading, when the temperature is over 27°C.
- Do not pour large amounts of cold water onto an overheated pig.
- Load and unload promptly to avoid heat build-up.

SOURCES

[National Pork Board TQA program](#)

[Loading Density Guidelines](#). Under “Resources — Transportation.”

St-Pierre, N.R., B. Cobanov and G. Schnitkey. 2003. [Economic Losses from Heat Stress by U.S. Livestock Industries](#). *J. Dairy Sci.* 86:E52–E77.

[University of Minnesota PorkBridge Educational Series](#)

[Ventilation for Livestock and Poultry Facilities](#). Pub 833, OMAFRA.

Xin, H., and J. Harmon. 1998. *Livestock Industry Facilities and Environment: Heat Stress Indices for Livestock*. Iowa State University.

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1. Pollmann, D.S. 2010. Seasonal effects on sow herds: Industry experience and management strategies. *Journal of Animal Science* 88 (E-Suppl. 3): 9.

This factsheet was written by Jaydee Smith, Swine Specialist, OMAFRA, and Laura Eastwood, Swine Specialist, OMAFRA.