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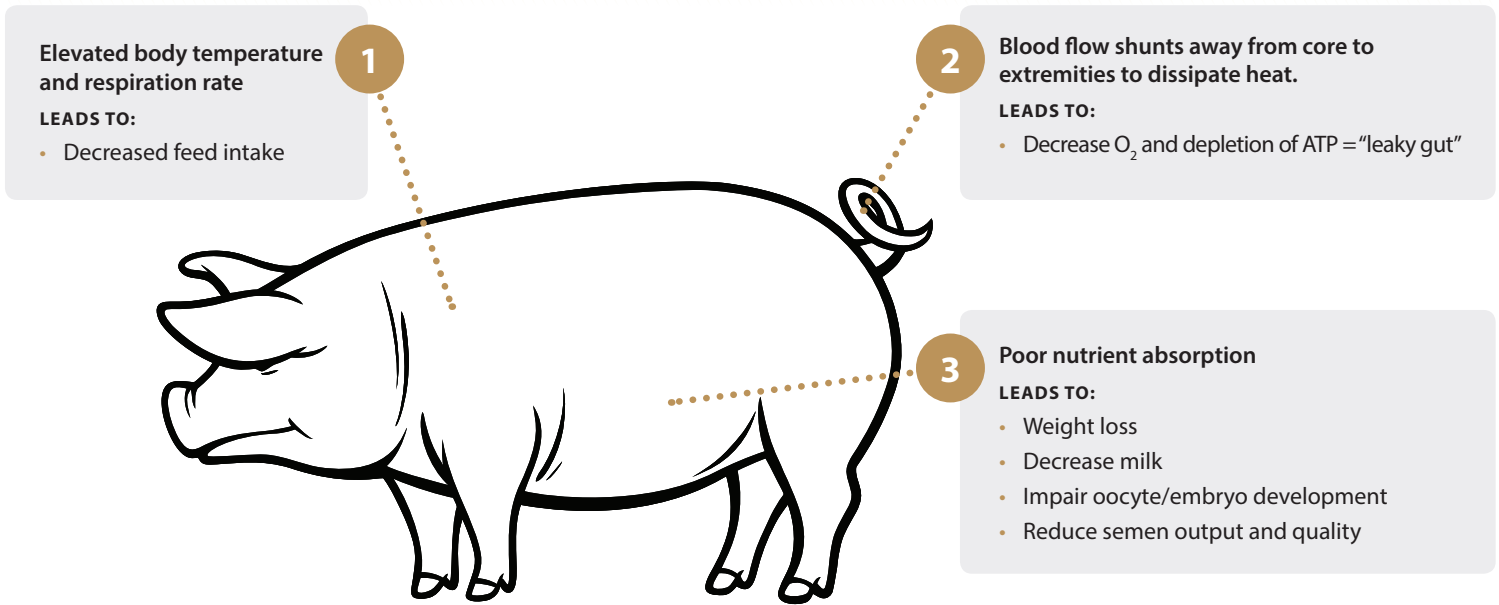
# Heat Stress Physiology in Swine

*Temperatures in the summer months in the U.S. can be hot enough to exceed an animal's thermoneutral comfort zone (table 1) and negatively impact pigs at all stages of production. However, temperature typically doesn't act alone. Rather, environmental stress also includes humidity and ventilation in the barn.*

## Physiology of heat stress

Thermoreceptors in a pig's skin react to changes in environmental temperature. As the external temperature increases, warm blood in the animal's body will shunt from core organs to the extremities; by dissipating excess body heat, the pig attempts to maintain a normal core body temperature. When heat dissipation through the skin becomes ineffective, the animal will increase its respiration rate, or pant, to dissipate additional heat. Once methods of dissipating heat have failed, the animal's body temperature will rise.

The shunting of blood to the skin can reduce the amount of blood flow to reproductive organs and the digestive tract — and that negatively impacts production. The reduction in blood flow to the digestive tract can prevent the delivery of oxygen to the tissues, resulting in intestinal damage and reduced barrier function. This results in gut inflammation and reduced nutrient absorption. With more extreme heat stress, toxic elements from gut contents are absorbed directly into the bloodstream.



**Table 1 – Thermal comfort ranges for pigs at various stages of production.**

Adapted from the Pork Industry Handbook

ANIMAL	FAHRENHEIT	CELSIUS
Lactating sow	50-70	10-21
Mature boar	50-70	10-21
Gestating sow	50-70	10-21
Newborn piglet	90-100	32-38
Nursery (30-50 lb.)	70-80	21-27
Nursery (50-75 lb.)	60-70	15-21
Weaner	75-86	24-30
Growing/Finish pig	50-70	10-21

**Table 2 – Production measures impacted by heat stress**

GROWING PIG	GILT	SOW LACTATION	SOW BREEDING/GESTATION	BOAR
<ul style="list-style-type: none"> <li>Reduced weight gain</li> <li>Increased disease</li> </ul>	<ul style="list-style-type: none"> <li>Delayed puberty</li> <li>Less intense signs of estrus</li> </ul>	<ul style="list-style-type: none"> <li>Decreased weaning weights</li> <li>Increased weight loss</li> </ul>	<ul style="list-style-type: none"> <li>Decreased conception rate</li> <li>Increased embryo mortality</li> <li>Increased wean-to-estrus interval</li> <li>Less intense signs of estrus</li> </ul>	<ul style="list-style-type: none"> <li>Reduced semen output</li> <li>Reduced semen quality</li> </ul>

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