

Central Washington Animal Agriculture Team



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Environmental Management of Young Pigs During Cool Weather

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It is well known that market pigs and sows suffer from the heat during the summer by decreasing feed intake, growth and milk production, but we often fail to realize that younger pigs suffer equally or to a greater extent during the cooler times of the year. Harmful results of chilling include slower growth, poor feed efficiency, loss of body fat, greater susceptibility to diseases such as scours and pneumonia, higher mortality and even an increase in tail biting.

When conditions are too cold, the pig will attempt to adapt by increasing heat production within its body and by minimizing heat loss. Shivering increases metabolic heat production, and increasing feed intake increases heat production from digestion of feedstuffs which helps make the pig feel warmer. This is the feeling you get after eating a huge meal. Unfortunately, when pigs are stressed, they eat less rather than more so their heat production actually decreases. This is especially true at weaning time and when feeder pigs are hauled to a new location as they are when youth purchase their project pigs in the winter or spring. Great care must be taken to keep them warm during transport and for at least 1-2 weeks after they arrive. Specific

mechanisms to minimize heat loss include: huddling together, tucking their legs beneath their bodies to limit contact with the floor and seeking shelter or the warmest, least drafty area in their pen. Young pigs may even alter their dunging and sleeping habits and lie down in their excrement because feces and urine provide a temporarily warm floor. Of course, in the long run, this behavior gets them wet, increases heat loss from their body and just makes them feel even colder.

Lower Critical Temperature (LTC) is the temperature below which an animal must expend additional energy to maintain normal body temperature and essential body functions such as eating, drinking, playing and moving about. The **Upper Critical Temperature** (UTC) is that which adversely effects pig performance and normal bodily functions including decreased feed intake and rate of gain due to heat stress. The range between LTC and UTC is called the **Thermo- neutral Zone** or **Comfort Zone**. The **Comfort Zone** varies by the age and size of the animal with larger pigs generally tolerating extremes in temperature better than small pigs. This is especially true for the LTC which is

much higher for younger pigs than older ones. Young pigs up to 45-50 lbs are very sensitive to low temperatures and become chilled quickly. On the other hand, finishing pigs and lactating sows are much less sensitive to cold but don't tolerate high environmental temperatures very well at all. In Eastern Washington, young pigs housed outside will be below their LCT and feel cold at night for at least 9 months out of the year, from mid-September to mid-June. In Western Washington, this would be true for almost the entire year, not only due to cooler temperatures but also due to damp conditions.

The temperature that pigs feel is seldom the same as what we read on a thermometer or that we as humans feel in the same environment. The temperature that the pig feels is called **Effective Temperature**. First of all, it is critical that we measure temperature at pig level since that may differ several degrees from a reading made at eye level on the wall several feet away from the pigs. For nursery pigs, this would be at a height of about 8-12 inches inside the animals' pen. Even if measured properly, the reading on the thermometer is probably not the temperature that the pigs feel because there are several factors in addition to age and size that influence **Effective Temperature**. Therefore, the animal may not be comfortable and productive even if the temperature on the thermometer is within its **Comfort Zone**. **Effective Temperature** is influenced by losses of heat from the body in at least four different ways.

Air moving across the animal's body due to drafts, poorly designed or improperly managed ventilation or use of open-sided shelters for young pigs in fall, winter and spring.

Radiant losses to cold surfaces such as poorly insulated walls, and ceilings, even though the animal is not touching the surface. This is the

feeling you get when you sit beside a single pane glass door in winter time as compared to sitting beside a heavily insulated wall. Your body heat is being used to warm that glass door.

Convective losses to surfaces the animal actually touches, especially floors. Concrete and metal floors are much "colder" than plastic, rubber mats or wood. Pigs lose half as much heat to a wooden floor as to concrete and only one-sixth as much to a plastic floor. However, wood is impossible to clean and disinfect so it is not recommended as a permanent flooring material. Slatted floors are much colder than solid ones, regardless of material.

Evaporative loss of heat from the surface of the pig's body occurs whenever the pig gets wet. Evaporation of water from the skin takes heat with it. This is the cold, shivering phenomenon you feel when you get out of a warm shower and step into a cold room. Examples include accidentally spraying pigs while washing down facilities, pigs lying in their own feces and urine, wet floors from leaking water cups or using water to clean pens. We use this principle to keep finishing pigs cool in the summer by spraying or misting them during the heat of the day.

How much do these losses of heat influence the way the environment feels to the pig; i.e., the **Effective Temperature**? For example, a slight draft of 40 ft/minute feels chilly to a 3-4 week old pig and makes an 80° room feel like 73°. This minimal draft is often not even detectable by people. A draft of 100 ft./minute will make that same room feel like 67°. Poor insulation in walls and ceilings and wet, cold floors will drop the **Effective Temperature** by 7° with each factor.

Therefore in a room where the

thermometer at pig level reads 80° but there is a slight draft (-7°) and the concrete floors are wet (-7°), the pigs will feel like its 66°. Lack of insulation will drop **Effective Temperature** another 7° to 59°F.

Now for the good news. Providing a deep dry, straw bed will increase effective temperature by 8-12°. Therefore, pigs in a pen at 70° will feel more like 80°. As a general guide, dry straw bedding will make up for most of the harmful effects of cold, wet floors and lack of insulation. However, drafts can still be a major problem, especially for 30-50 lb show pigs purchased by youth in winter or spring when night temperatures are in the 30's or 40's, even if a deep straw bed is provided. At best, even with no drafts, the effective temperature will be 55-65° and pigs will feel chilled and probably get sick. Most other types of bedding, including shavings, are not nearly as effective as clean, dry straw. Ground or finely chopped straw is also less effective than "long" straw.

The table below shows the recommended range of **Effective Temperatures** for pigs of various sizes.

PIG COMFORT ZONES			
	Effective critical temperatures, °F		
Category	Weight, lb	Lower	Higher
Newborn	2-6	93	100
Nursing	6-12	85	95
Weaned	12-18	80	90
Nursery	18-50	70	85
Grower	50-130	60	75
Finisher	130-275	55	75
Gestating gilts and sows	275+	55	75
Lactating gilts and sows	300+	55	70
Boars	300+	60	75

It is clear that older/heavier pigs are more resistant to cold and less resistant to heat and we, therefore, are

more concerned with their comfort and well-being in the summer.

Younger/lighter pigs up to about 8 weeks of age or 50 lbs can tolerate heat but are extremely sensitive to cold.

Since cold stress can be very harmful to the health and productivity of young pigs, what can be done to minimize it and make these smaller pigs as comfortable as possible? The following list is not exhaustive but includes some of the most important steps for pigs from birth to 50 lbs.

Learn how to identify cold-stressed pigs.

Shivering pigs huddled together or lying with their feet tucked beneath them are sure signs of discomfort. Many of these pigs will get skinny and develop long rough hair coats if the cold stress continues for more than a few days.

Make sure that the temperature in the pig area is at least above the LCT shown in the table above.

Keep pigs dry at all times and replace or add new dry bedding frequently.

Eliminate drafts. Decrease ventilation during the cooler months, plug holes in walls and ceilings, replace broken windows. Use solid pen dividers. Never leave doors or windows open.

Add insulation to walls and ceilings.

If your facilities are inadequate to prevent heat loss and maintain the minimum **Effective Temperature**, create a microenvironment. Combine zone heating such as heat lamps or heated mats with hovers, creep boxes and/or kennel-type rearing pens. Hovers are used for suckling piglets and the rearing pens are best suited for nursery pigs. Features common to all three are lids or covers, solid floors, and they are made of "warm materials." Do not use steel, aluminum or concrete.

Limit multiple stressors. Do not wean, vaccinate, castrate, change feed, transport, change environment and mix pigs on the same day. Doing more than two of them simultaneously will make the pigs more susceptible to chilling and health problems such as diarrhea.

Examples of good practices to limit multiple stressors:

When weaning, just remove the sow and leave the pigs where they are for 1-3 days.

Make sure castration and vaccinations are done well before weaning or transport.

When purchasing 30-40 lb show pigs, bring them home and put them in an environment that has an **Effective Temperature** higher than what they were used to and higher than their LCT. This would be 75-80°F. Do not change feed, mix animals or impose any other management stressors for about a week. A kennel-type pen is very useful here. It has solid pen dividers, partially-slotted floor and an insulated cover with a nipple waterer and a self-feeder. Use a piece of plywood over the slats for a few days and then remove it. You can even use straw in this pen while the plywood is in place. Do not reuse plywood for another group of pigs. *J. A. Froseth*