Joosten
young animal nutrition
We care for the little ones

6 tips to manage heat stress

Minimize the negative effects of heat-stressed sows on piglet development

In summer time, and all year long in hot tropical climates, increase in temperature and humidity (figure 1) can cause serious problems in swine farming. Since pigs lack the ability to sweat, they are extremely sensitive to heat stress. "Heat stress is far and away the single biggest loss we see. It will have more impact on the industry than disease because it hits every farm" (Steven Pollmann PhD, consultant).

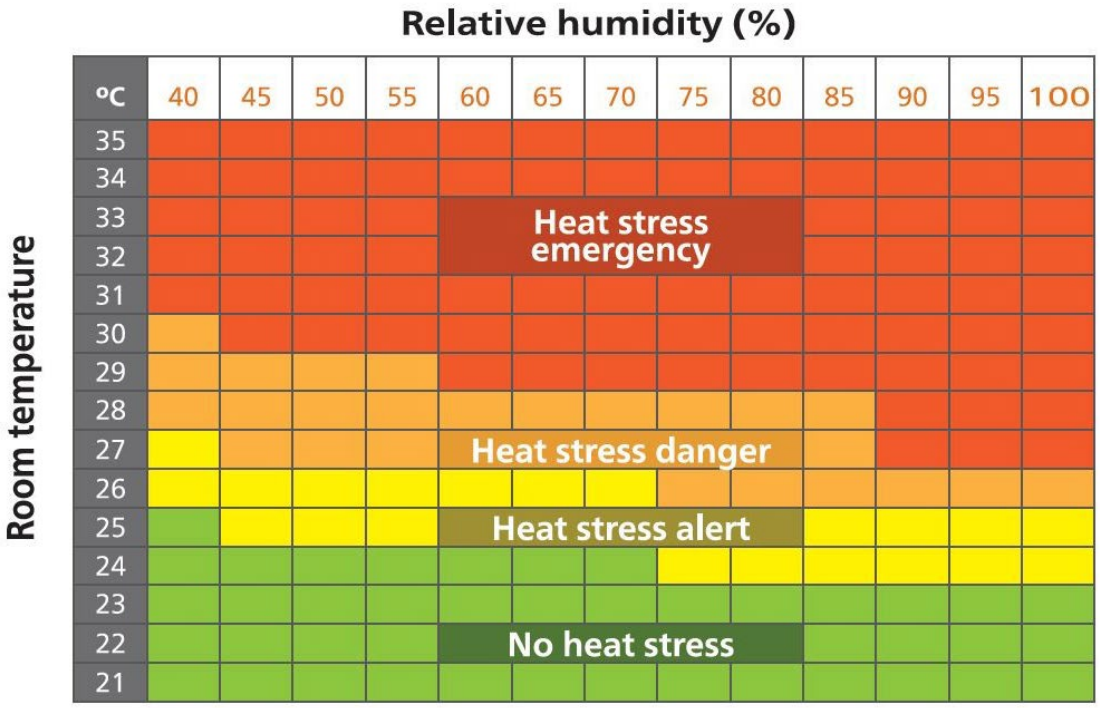

Figure 1. Experiencing heat stress depends on a combination of temperature and humidity (Heat Stress Index, Iowa State University)

Depending on humidity, mature pigs can become susceptible to heat stress at about 70° F (21 °C), as their thermoneutral zone is 18-20 °C. If temperatures stay at 80° F (27 °C) or higher for several days, this is usually causing a myriad of negative effects.

In particular sows and even more lactating sows, have difficulties coping with these extreme climate circumstances. Sows are very sensitive for this heat after farrowing and in the same time, their requirements are high as they have to feed and raise their litter. When she is subject to high temperatures, there comes a point when the sow is no longer able to regulate her interior body temperature. Heat stress in lactating sows manifests in a decreased feed intake and lower performance like, decreased piglet birth and weaning weights, more days to oestrus after weaning, lower farrowing rate and subsequent litter size. A heat-stressed sow is easy recognisable, as they increase breathing (>50 breaths/min).

Not only feed intake is decreased, but at the same time an animal under heat stress also increase their maintenance requirements as it directly affects internal biological systems. A 1 degree C change in body temperature alone

has the potential to increase caloric need by 7 to 15%. Lower feed intake together with an increased maintenance requirement, results in:

- Less milk production and **lower weaning weights** (figure 2 and table 1)
- increased body condition loss during lactation resulting in **decreased post-wean fertility**
- **decreased farrowing rates** due to lowered conception rate

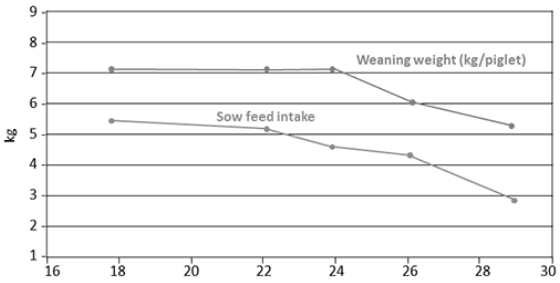

Figure 2. Effect of ambient temperature (°C) on sow lactation feed intake and piglet weaning weights (adapted from Quiniou and Noblet, 1999).

In table 1 an overview is given of the effects increasing farrowing room temperature from 20 ^{0}C (thermoneutral zone) to 29 ^{0}C (above upper critical temperature). Feed intake drops dramatically with 45%. Heat-stressed sows lay down longer time during the day, taking less meals per day and spending less time eating. This drop in energy intake automatically causes a loss in body condition. Sows under heat stress loose more than double as much body weight compared to sows housed in a comfortable temperature. The 30% decrease in milk production causes a lower piglet weaning weight.

*Table 1. Effect of the level protein of ration in the behaviour of lactating sows in atmospheres of thermal comfort and caloric stress (*Renaudeau et al., 2002; *Renaudeau and Noblet, 2001*).

	20 ^{0}C	29 ^{0}C	
Feed intake (kg/d)	7.44	4.15	P <0.001
No. of meals per day	9.4	6.5	P <0.001
Feed consumption time (min/d)	63.6	37.7	P <0.001
Body weight loss	16.3	36.3	P <0.001
Backfat loss (mm)	3.3	4.2	-
Milk production (kg/d)	10.43	7.35	P <0.01
Mean litter size	10.6	10.6	-
Piglet weaning weight (kg)	9.21	7.45	P <0.01

Not only after farrowing, but also before farrowing during the end of gestation, sows have an acute sensitivity for heat stress. Gestating sows produce a lot of internal heat, making them more susceptible for heat stress. Heat stress during gestation results in long-term developmental damage to the offspring. Heat-stressed sows also have a shorter gestation period and reduced litter birth weight. The piglets of gestational heat-stressed sows have to coop with an increased body temperature and impaired reproductive glands development. Thus, gestational heat stress can significantly impact a complete herd through its long-term effects on the piglets. (Lucy and Safranski, 2017).

Practical tips that will help to manage heat stress

1. *Adjust sow feeding protocol*
   Switch to smaller, more frequent meals per day and feed when it is cool. Wet the feed with water, to increase feed intake. Keep feed fresh as it is more likely to spoil in warm temperatures.

2. *Provide enough fresh clean drinking water.*
   Water is always of importance, but especially in a hot climate. Check flow rates of nipples, providing at least 2 liter per minute in lactation. In summer, lactating sows can drink over 40 liter of water per day.

3. *Adjust sow feed formulation*
   - Increasing the energy concentration of feed (preferably with fat sources as starch generates more metabolic heat) to compensate for lower feed intake. Incorporating a smaller amount of fibers as the fiber fermentation process produces heat.
   - Use easy digestible raw materials, to decrease internal heat production.
   - The negative effects from heat stress can be counteracted by adding antioxidants.
   - Evaluate trace mineral levels. Make sure that vitamins, minerals and amino acids are balanced with the energy you provide. These levels may need to be increased during times of heat.

4. *Include Delac Dulce*
   Increase sow feed intake by improving palatability and take the benefit from vertical imprinting by adding Delac Dulce to the sow's feed end of gestation and during lactation. Including (or topdressing) Delac Dulce in sow feed enhances feed intake and provides the sow with easy digestible protein. Next to the increase in sow feed intake, including Delac Dulce in sow and piglet feed, will also benefit the piglets as they are more likely to start eating creep feed, supporting their development.

5. *Add extra cooling*
   Place extra stir fans, water drippers or cool cells in gestation and farrowing rooms to reduce heat stress on sows.

6. *Support the piglets*
   Feed intake of the lactating sow decreases in summer. This has a direct negative impact on milk production. Support the piglets by feeding them additional milk, like Nutrilac or Nutrilac Plus.

References

Kluger, M. J. (1978). The evolution and adaptive value of fever: Long regarded as a harmful by-product of infection, fever may instead be an ancient ally against disease, enhancing resistance and increasing chances of survival. American Scientist, 66(1), 38-43.

Renaudeau, D., Quiniou, N., Dubois, S., Noblet, J. (2002). Effects of high ambient temperature and dietary protein level on feeding behavior of multiparous lactating sows. Animal Research, EDP Sciences, 2002, 51 (3), pp. 227-243.

Lucy, M.C., Safranski, T.J. (2017). Heat stress in pregnant sows: Thermal responses and subsequent performance of sows and their offspring. Mol Reprod Dev., 84(9), 946-956.

Renaudeau, D., Noblet, J. (2001). Effects of exposure to high ambient temperature and dietary protein level on sow milk production and performance of piglets. *Journal of Animal Science*, 79 (6), 1540–1548.