RES4LIVE
ENERGY SMART LIVESTOCK FARMING
TOWARDS ZERO FOSSIL FUEL CONSUMPTION

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Pigs' thermal comfort and the relationship with productivity

The optimal thermal conditions for pigs are expressed as the thermo-neutral zone, an effective temperature range in which the pigs have to use a minimal amount of energy to keep their core body temperature constant. Outside of this zone, cold stress or heat stress occurs, which results in discomfort, loss of productivity or even death.

For pigs, the thermo-neutral zone depends highly on the age. But also, the housing conditions will have an effect, like air velocity, floor type, building insulation, etc. The boundaries of the thermo-neutral zone that we use today are still mostly based on research from the 1950s to 1970s, while significant changes in swine genetics and nutrition have occurred since.

For heat stress, lactating sows, gestating sows and heavy fattening pigs are most at risk. Heat stress results in changed lying behaviour, increased respiratory rate, decreased feed intake and increased skin and rectal temperatures. The most important consequences on productivity are a lower body weight of the sows' offspring, higher abortion rate, higher feed conversion ratio and increased mortality. As the internal heat production of pigs has increased the past 50 years due to increase in leanness, modern day pigs are more susceptible to heat stress. Combined with global warming, heat stress is occurring more frequently and severely throughout Europe, leading to serious economic losses.


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Cold stress on the other hand is most critical for young pigs, since they don't have brown fat tissue yet, which produces heat at low temperatures. Cold stress is an important cause of piglet mortality. Other consequences are increased feed intake without increased body weight, and decreased meat quality.

As a practical recommendation, it is very important to regularly check the actual ambient temperature in the pig pens and the pigs' behaviour, and to use the most recent thermo-neutral zones for pigs while correcting for other environmental conditions. Pay special attention to the new-borns, preventing cold stress, and to the sows and heavy fattening pigs, preventing heat stress. In RES4LIVE, the goal is to provide optimal comfort for the pigs with renewable energy systems and smart control. Heat pumps for example can provide both heating and cooling, which is vital for optimal productivity of the pigs.

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