INNO+

WE ENERGISE FARMING

InnoCool

Innovative cooling against heat stress in the barn

Top climate for healthy animals and better performance

Even on the hottest days

As a livestock farmer, you know how important it is to create optimal conditions for your animals, even when temperatures rise. Heat stress is a growing challenge in livestock farming. It not only affects the welfare of your animals, but also their productivity.

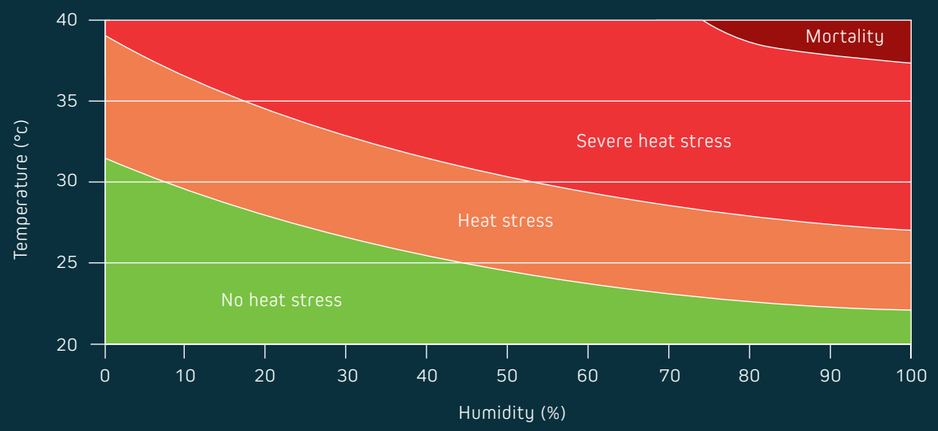
With InnoCool, Inno+ offers an innovative solution that helps tackle heat stress at its source. Without adding moisture, this system provides effective and stable cooling of the incoming air. This keeps your animals healthy and your production levels up, even during prolonged heat waves.

Heat stress among your livestock: a growing problem

Summers are getting hotter and prolonged heat waves are becoming more common. Not only humans but also farm animals suffer from this heat. Heat stress is a serious problem in livestock farming, with far-reaching consequences for animal health, productivity and welfare.

What is heat stress?

Heat stress occurs when an animal is unable to release its body heat properly. This happens primarily at high temperatures combined with high humidity. Animals try to cool down, eat less and become exhausted more quickly.



The consequences in short

Reduced productivity
Heat stress reduces animals' appetite, often causing a drastic drop in feed intake and reducing the body's efficiency. This leads to lower meat, milk and egg production. It also has a negative impact on feed conversion.

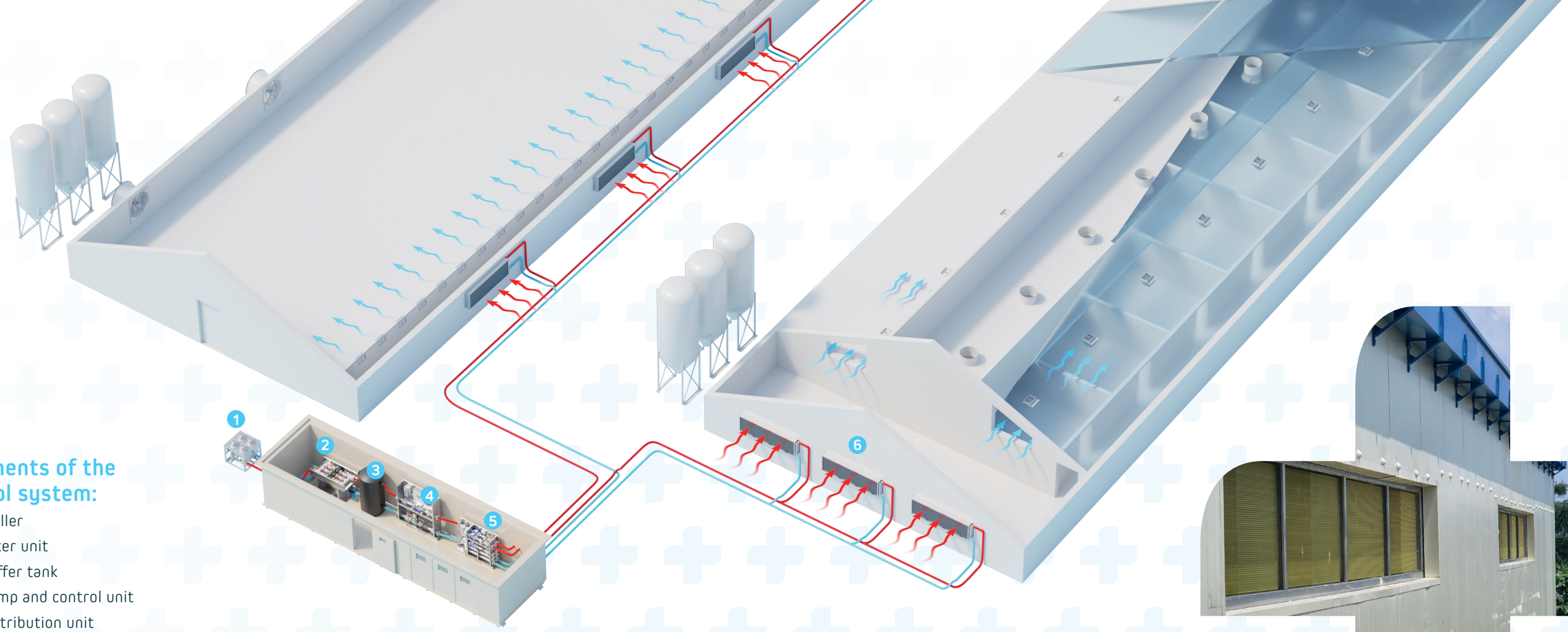
Fertility problems
Heat stress leads to reduced fertility during and after hot periods. Because heat stress often causes a loss of condition, this can have negative consequences for the next cycle.

Health problems
Animals under heat stress are often more susceptible to disease and infection because their immune systems function less effectively under extreme conditions.

Behavioural changes
Heat stress causes behavioural changes, such as increased aggression or restlessness in animals.

Increased mortality
In cases of severe heat stress, the body is unable to recover, which in extreme cases can lead to acute mortality in animals.

The effects of heat stress often continue to affect production for months.



Components of the InnoCool system:

1. Chiller
2. Filter unit
3. Buffer tank
4. Pump and control unit
5. Distribution unit
6. Heat exchanger

How InnoCool works

InnoCool lowers the temperature of the air entering the barn by means of a heat exchanger. Cooled water flows through this exchanger, cooling the incoming air and effectively dehumidifying it. This is in contrast to traditional methods such as nozzle or pad cooling, which add moisture.

Even on extremely hot days, InnoCool achieves barn temperatures of around 22 °C. Thanks to this indirect cooling technique, moisture is also extracted from the air. This happens because InnoCool cools the air to below the dew point; the temperature at which the air becomes saturated with moisture and condensation occurs. As a result, water vapour from the air condenses and is removed. The result is a drier, cooler air flow that significantly increases the comfort of the animals and minimises the risk of heat stress.

How does InnoCool work step by step?

Step 1: Incoming air is pulled in
Fresh outside air is fed into the InnoCool system via the ventilation system.

Step 2: Cooling via heat exchanger
The use of a heat exchanger ensures that the incoming air does not come into direct contact with the cooled water. This lowers the temperature of the air without adding moisture.

Step 3: Dehumidification
By cooling with water at 10 ºC, the temperature of the incoming air drops below the dew point (17 ºC). Condensation removes moisture from the air during this process. This results in a more comfortable barn climate for the animals.

Step 4: Cooled and dry air enters the barn
The air flows into the barn at a pleasant temperature and with less moisture. This prevents heat stress and ensures a stable climate.

Applications and configurations

InnoCool can be used in various types of livestock housing and can be integrated with virtually all ventilation concepts. Inno+ basically uses two ventilation methods to distribute incoming air evenly throughout the livestock housing.

Ceiling ventilation

With ceiling ventilation, air is drawn in through the loft of the barn. The incoming air first passes through the heat exchanger, where it is effectively cooled. The cooled air then flows through the attic space. Ceiling inlet valves distribute this air evenly throughout the barn. This ensures calm and stable air distribution, which contributes to a comfortable and healthy barn climate for the animals.

Ventilation via wall inlet valves

With ventilation via wall inlet valves, air is drawn in through the side wall of the barn. The side wall contains heat exchangers that ensure that the incoming air is cooled first. The air then enters an in-between space. From this in-between space, the air flows into the barn at the correct speed and evenly distributed, ensuring a stable and comfortable climate for the animals.

InnoCool versus traditional cooling methods

Traditional systems such as cooling pads and nozzle cooling lower the temperature by adding water to the air. However, this increases the humidity in the barn, making it more difficult for animals to lose heat. The result is less effective cooling and an increased risk of heat stress.

InnoCool takes a fundamentally different approach. The system cools the air without adding moisture and even actively extracts moisture by cooling below the dew point. This creates a cool and less humid airflow, which actually lowers the perceived temperature and ensures a stable, comfortable climate for your animals.

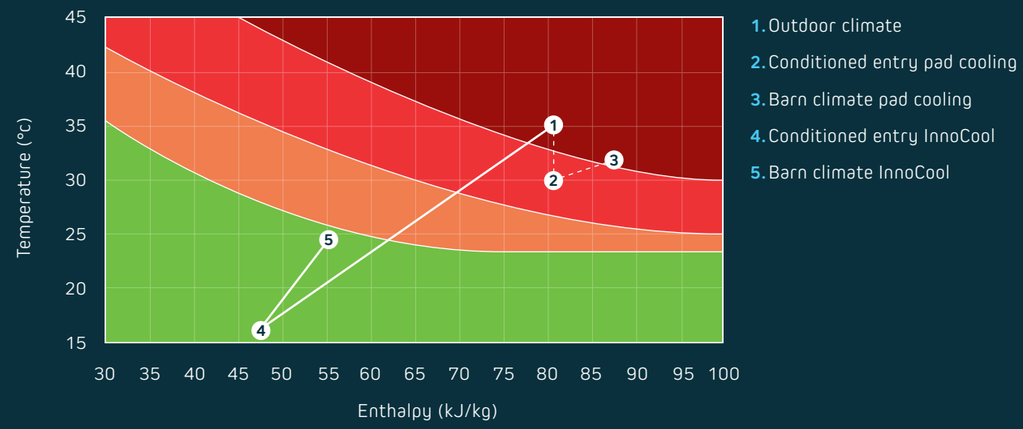
	Outdoor climate (1)	Pad cooling		InnoCool	
		Conditioned entry (2)	Barn climate (3)	Conditioned entry (4)	Barn climate (5)
Temperature	35 °C	30 °C	32 °C	17 °C	24,3 °C
Relative humidity	50%	73,6%	70%	99%	70%
Absolute humidity	17,7 g/kg	19,8 g/kg	21,4 g/kg	12 g/kg	13,3 g/kg
Enthalpy	80,8 kJ/kg	80,8 kJ/kg	87,2 kJ/kg	47,51 kJ/kg	55,47 kJ/kg

Reducing enthalpy: the key to effective cooling

An important difference between InnoCool and traditional cooling methods is the way in which the system reduces the enthalpy of the air. Enthalpy is the amount of heat and moisture present in the air, expressed in energy (kJ/kg). The higher the enthalpy, the more energy there is in the air and the more difficult it is for animals to dissipate their body heat.

In short: **the lower the enthalpy, the better the animals can dissipate their heat and therefore perform better.**

The effect of cooling on heat stress



1. Outdoor climate
2. Conditioned entry pad cooling
3. Barn climate pad cooling
4. Conditioned entry InnoCool
5. Barn climate InnoCool

Advantages of InnoCool

Effective cooling, regardless of the outdoor climate

InnoCool ensures a cool and stable barn climate anywhere in the world, even in tropical climates with extremely high humidity.

Prevents heat stress

Lower temperatures and lower humidity levels ensure that animals remain comfortable, even on hot days.

Reduced animal mortality

A comfortable barn climate prevents heat stress and mortality rates from rising.

Improved animal health and productivity

By preventing heat stress, you also prevent production declines, fertility problems and health issues.

Measurable results and control

An important advantage of InnoCool is that less ventilation is required to achieve an optimal stable climate. Because the air that enters is already cooled and dehumidified, less warm and humid air needs to be removed from the barn. In addition, less air movement is needed to achieve the same cooling effect.

This makes it possible to run the climate system more efficiently, resulting in both energy savings and more stable conditions.

Protect your animals from heat stress Choose smart cooling.

Would you like to minimise the impact of heat on your farm? Contact Inno+ for tailored advice and discover how InnoCool fits into your business operations.

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