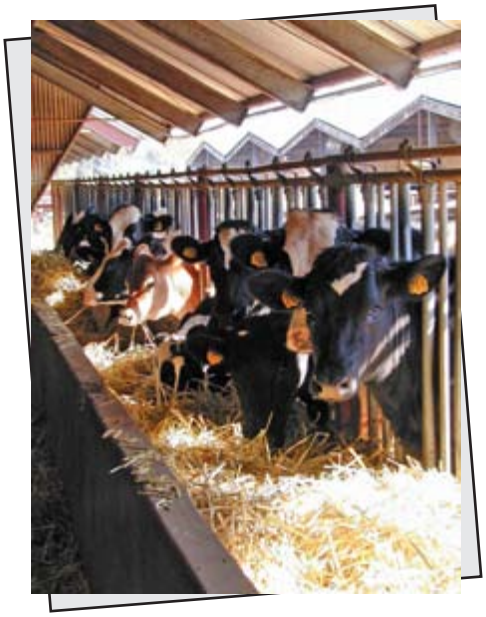
# High pressure FOGGING SYSTEMS

## MISTING AND LIVESTOCK

**Birds and animals, like humans, are happier and more productive when comfortable. Misting reduces heat stress and increase productivity.**

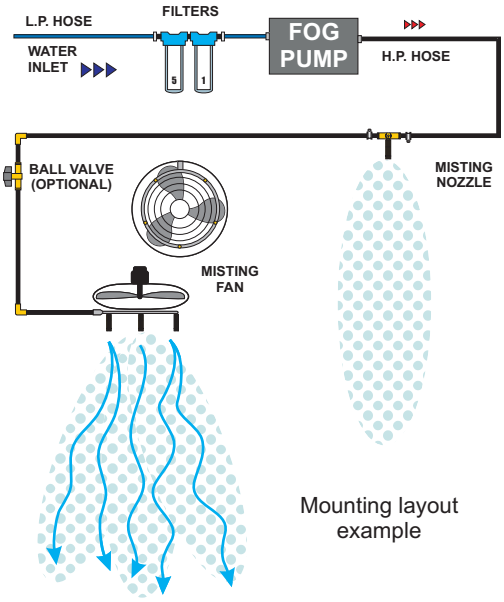


Misting provides heat stress relief for all categories of **poultry**. Mortality is dramatically reduced. Stress-free broilers continue to eat and grow. Layers produce more eggs. Breeders are more active and produce higher quality eggs.
In the **hog** world, misting increases the farrowing sow's appetite, which improves milk production. This, in turn, boosts the litter weight at weaning, increases the size of future litters and allows the sow to go back into heat quicker. Cool conditions increase sex drive and sperm count, as well as sexual development.
**Cattle** are also subject to heat stress. This condition can affect milk production, weight gain and breeding cycles. The misted cow is the contented cow is the productive cow.
Mother Nature has an unpleasant way of telling humans and **horses** to slow down when working in extreme heat, and if those warnings go ignored for too long, disaster can result. But races and heats and rounds and shows are held in all kinds of weather, and if we want our horses to do their best while competing in the heat, then we have to do our best to condition and acclimate them to withstand high temperatures.

**"The system cools the inhabitants without creating a wet environment."**

### MINIMAL OPERATING COSTS

Easy installation, minimum maintenance and low energy consumption. There are many proven cost-effective uses for evaporative cooling that make it the preferred choice. The installation and operating cost of EuroCooling systems can be much lower than traditional air conditioning.




Mounting layout example

### BENEFITS

- **Increases egg, milk, and meat production**
- **Reduces animal heat stress**
- **Extends breeding period and growth rate**
- **Results in cleaner, drier surroundings**
- **Dust suppression**
- **Odor control**
- **Reduces water and energy consumption**

### Comparison to phase-change (standard) air conditioning

**Less expensive to install**
Estimated cost for installation is 1/8 to 1/2 that of refrigerated air conditioning

**Less expensive to operate**
Estimated cost of operation is 1/4 that of refrigerated air. Power consumption is limited to the fan and water pump vs. compressors, pumps, and blowers.

**Fresh air**
The constant stream of air from intake to vent through the building freshens the air in the building.

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Via Canale 114 Loc. Villalunga
42013 CASALGRANDE (RE) - ITALY
Tel. 0522840805 Fax. 0522849962
www.eurocooling.it
E-Mail: info@eurocooling.it

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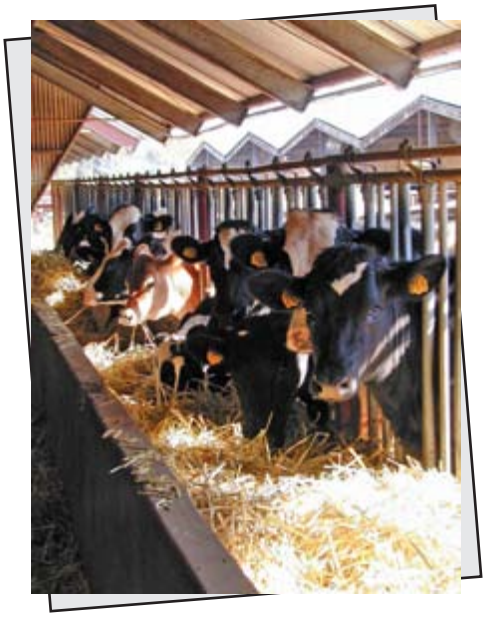
# MISTING AND DAIRY COWS

## Cattle without water misting have a physiological and behavioral stress response to heat which negatively affect on behavior, physiology, performance, and carcass traits.

Studies have found that at temperatures as low as 79°F, dairy cows will begin to cut feed intake and lose body weight. Milk production falls. Reproductive performance, health, and lactational performance are affected. Heat stress will continue to affect performance even in the cooler months ahead. High yielding cows are most susceptible to heat stress. All of this quickly impacts your pocket book!

The degree of heat stress suffered by the cow will depend on the combination of environmental conditions–- air temperature, relative humidity, air movement, and radiation from the sun. Dairymen use shades, fans, and ample fresh drinking water to help herds beat the heat; but often shade and ventilation are just not enough. In southern states, where heat and humidity are more severe, dairymen have also used sprinklers to provide added cooling effects.

Research has shown that intermittent misting in combination with shade and forced air movement is a very effective method of cooling diary cows, thereby reducing the production losses experienced during hot humid weather conditions. By using a high pressure, misting nozzles, enough water can be applied to fully cool the cows to the hide. The water is then allowed to evaporate, which pulls heat from the air and the animal, just like sweating. Increased air movement provided by fans, makes this system most efficient.



These results indicate that cooling cows with water applied through either a mist or spray can increase milk production if the system is installed properly. Overall, the combination of mister and fan cooling system provided the best choice in several studies, because water use and waste-waterrunoff were reduced compared tostandard spray system.

## Effects of ventilation and misting on behaviour of dairy cattle in the season in south Italy

MILK YIELD +4kg/day
kg/head/day

*Published by the American Society of Agricultural and Biological Engineers, St. Joseph, Michigan www.asabe.org Citation: Pp. 303-311 in Fifth International Dairy Housing Proceedings of the 29-31 January 2003 Conference (Fort Worth, Texas USA) 701P0203. Authors: F. Calegari, L. Calamari and E. Frazzi*

This research evaluated the effectiveness of the ventilation and misting equipment on three farms with Italian Friesian cows in the South of Italy. This research was carried out in the hotter period (May - September) during two consecutive years.

At each farm there were two homogeneous groups of animals with respect to production, number of calving and lactation phase The first group was raised in a pen with environmental conditioning system limited to the feeding area and carried out with the use of ventilation and misting (FM). The second group, which was the control group (C), was not conditioned. The microclimatic parameters (temperature and relative humidity) were recorded continuously at each farm by electronic probes which were put at animal height and connected to a data logger. Weekly individual measurements were performed on milk yield and behaviour observing the animals in different areas two times a day. The difference in milk yield between C and FM group ranged between 1-3 kg/head/day and, in the hottest period, ranged between 2-4 kg/head/day. Animal behaviour changed as the climatic conditions varied. On average, in the conditioned pen, we noticed higher values in the rate of standing animals in the feeding area (18.6 % in FM vs. 12.9% in C) and lower values in the rate of lying animals in the resting area (31.3% in FM vs. 34.0% in C). These results show the value of the treatment with the use of ventilation and misting of water.

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# MISTING AND SWINE

## When the hot weather hits, eating a big meal is the last thing on anyone's mind. With temperatures in the 30s and 40s, pigs are probably too busy dreaming of a distant mud puddle to worry about their next meal.

The growth performance of animals is often affected by extreme environmental conditions. In the case of swine, generally a cold environment will increase feed intake as the pig strives tomaintain body temperature, while warmer environments mayreduce growth, increase body maintenance demands, and sub-ject the animal to environmental stress.

All animals have a thermoneutral zone, the range of temperatures at which they are most comfortable and their body temperature remains constant. Summertime temperatures often exceed the thermoneutral zone for pigs. Since air conditioning is much too expensive to be a practical consideration, spraying pigs with water is one option that can help to reduce stress.

Past research has proven that high environmental temperatures (>25°C) adversely affect feed intake and subsequent performance. As temperatures rise, physiological changes in the pig also occur, including increases in rectal temperatures, respiration rates and pulse rates. Appreciating the physiological response of the pig at high temperatures provides additional insight into ways to minimize misting, and therefore water usage. Researchers theorize that misting may only be necessary during those events that are most likely to raise the pig's body temperature, like during a meal.

Misting has proven to be an effective method to reduce heat stress during peak summertime temperatures in swine facilities. Using misting or sprinkling to wet down pigs directly improves evaporative cooling efficiency since the process occurs at the skin's surface, rather than trying to cool down the pig indirectly by cooling the air. Think of how much cooler it feels when you step out of a pool on a breezy day. The same concept applies to evaporative cooling for pigs.

Researchers in have clearly demonstrated that it is essential to consider both the physiology of the pig as well as the housing constraints when using misting as a strategy to improve performance during hot weather. They assessed the impact of synchronizing misting and meals on feed intake and meal duration. The experiment studied eighteen 70 kg crossbred grower-finisher pigs (all barrows) for 30 days to observe the effect that misting, synchronized with meals, had on performance.

Three misting strategies were compared: 1) misting just prior to a meal, 2) misting between meals and 3) no misting. The air was held at 30°C and 50% relative humidity. The assessment was based on two variables, feed intake and meal duration.
The results are summarized in Table 1.

| Treatment | Feed intake (Kg) | Meal duration (h) |
|---|---|---|
| No mist | 0,623 | 0.233 = 14 min. |
| Prior to meal | 0,701 | 0.263 = 16 min. |
| Between meals | 0,619 | 0.210 = 13 min. |

**Table 1.**
*Effect of misting on feed intake and meal duration of grower-finisher pigs.*

## CONSIDERATIONS

Pigs misted just prior to a meal had significantly greater feed intake (13%) and ate significantly longer (19%) compared to the pigs on the other treatments. The effects appear to be the result of cooling the pig, therefore reducing the temperature spike that normally occurs during an activity, such as a meal.
This moderation of the body temperature seems to allow the pig to eat for a greater length of time before thermoregulatory controls restrict the meal duration and, as a result, the amount consumed.
While the short length of the present experiment did not allow an assessment of the whole grow-finish phase, the researchers suggested that increased feed intake should benefit growth performance over the long term.

**FEED INTAKE +13%**
**Better Growth Performace**

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# MISTING AND POULTRY

**Dealing with summertime heat is a great challenge for poultry Under conditions of severe heat stress, poultry will have a reduced growth rate, decreased feed intake, poor feed conversion, decreased egg production, reduced hatchability rate, reduced egg shell quality, reduced egg size and reduced internal egg quality. Additionally, heat stress can cause increased mortality.**

Dealing with summertime heat is a great challenge for poultry. All types and ages of poultry are susceptible to heat stress, but older poultry face a bigger risk. As poultry get older, they increase in size as well as insulation (feathering). This makes it harder for them to dissipate heat.

The most obvious sign of heat stress in poultry is panting. Poultry do not have sweat glands that can cool their skin, so instead they must use evaporation from their throat and respiratory system as a means of cooling themselves.

Panting takes a lot of energy which, in turn, generates an appreciable amount of body heat for poultry.

Ultimately, if poultry are not relieved of heat stress, their body temperature can continue to rise and increase the possibility of mortality. Fortunately there are several things you can do to help your home poultry flock handle heat stress.

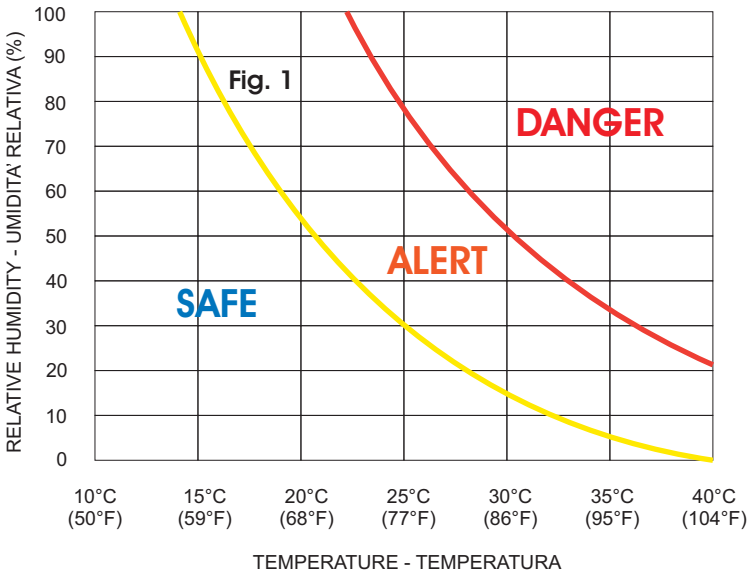


**Fig 1.** *Thermal comfort zones.*

## Effects of thermal stress on birds

Birds are able to regulate their body temperature by controlling heat loss through:

- *their skin and feather cover*
- *evaporation by panting*

This ability to thermoregulate is compromised if the birds are confined in close proximity to one another. This reduces their ability to lose heat by radiation, convection and conduction. Additionally, their ability to lose heat by evaporation is reduced if there is a high humidity. If the birds' ability to lose heat is reduced, their body temperature will rise and they will suffer from thermal stress, dehydration and exhaustion.
This compromises their welfare and can lead to a reduction in meat quality by causing:

- *alteration to the acid-base balance*
- *alteration to hydration state*
- *fatigue and depletion of energy reserves including liver and muscle glycogen loss*

Ultimately, **if body temperature rises by 4ºC or more, the bird will die**.

Placing poultry in a well-ventilated area will help reduce the incidence of heat stress. In addition, a misting/ fogging system can be used in a well-ventilated area to help the birds cool themselves.

**BIRD LOSS** Due to high temperatures **-99%**

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