



## DeLaval solutions for cooling cows



Creating a comfortable climate for relaxed cows

# Mechanically ventilated barn



A well ventilated dairy housing structure, whether for newborn calves or lactating cows, is essential, with an emphasis on fresh, clean air. Today's most productive dairy cows require an optimal indoor climate throughout the year in order to achieve and maintain their production potential. High moisture levels, manure gases, dust concentrations and other pathogens present in unventilated or poorly ventilated structures create a negative environment for animals. Stale air can also adversely affect milk production and milk quality.

Fans are the ideal way to deliver the necessary air exchange for the optimal climate. They should be selected to provide appropriate winter, mild weather, and summer ventilation rates based on the number of animals in the barn.

Placing fans in strategic locations throughout a dairy facility is the first step in providing supplemental cooling for the cows, assuming that adequate natural ventilation already exists and plenty of fresh water is always available. Research\* has shown that airflow with a velocity of between 2–3 metres per second (4–6 feet per second) will significantly help to maintain a comfortable temperature for the cows.

DeLaval dairy fans keep the air around the animals moving, in order to prevent heat stress and optimise milk production.

\* Source: Fan Cooling Dairy Cows by Curt A. Gooch, P.E.



### DeLaval dairy fan DF710

This 71 cm fan propels air around your animals at a rate of max 16,400 m<sup>3</sup>/h, thereby preventing heat stress. The fan should be installed at an angle of 19° to 21° along feeding tables or above cubicles. Allow six to eight metres between each fan for an optimal ventilation pattern. In holding areas, the fan should be installed at an angle of 15° to 30°. The sturdy protection grill means fans can be placed at a height lower than 2.7 metres.

DeLaval DF710 is built for durability and will withstand harsh barn conditions such as high levels of ammonia, for constant operation with minimal maintenance.

It is possible to install the DF710 in combination with the DeLaval dairy fan DF1300.

#### TECHNICAL DATA

- Propeller diameter: 710 mm
- Voltage/frequency: 3 x 400 V / 50 Hz
- Amperage: 1.3 A
- Power consumption: 0.5 kW
- Motor protection class: IP 55
- Noise level: 59 dB(A)
- Fan speed: 900 rpm
- Max capacity at 0 Pa: 16,400 m<sup>3</sup>/h
- Specific efficiency: 30.5 W/1000 m<sup>3</sup>/h
- Weight: 28 kg
- Controllable by DeLaval thermal control TC1

### DeLaval dairy fan DF1300

The DeLaval dairy fan DF1300 solution can ventilate an entire dairy cow housing facility. This means fresh corners, an equalized internal climate and fewer flies annoying the cows. The 130 cm fan provides optimal ventilation by moving air at a rate of max 48,500 m<sup>3</sup>/h. Installed at a minimum height of 2.7 metres and with a 10° to 12° angle, it provides an optimal ventilation pattern in the barn, along the feeding table or in the holding area.

This fan – easy to install, use and maintain – has a low noise level to help keep your cows calm, in a relaxed and comfortable environment.

#### TECHNICAL DATA

- Propeller diameter: 1300 mm
- Voltage/frequency: 3 x 400 V / 50 Hz
- Amperage: 2.8 A
- Power consumption: 1.3 kW
- Motor protection class: IP 55
- Transformer controllable
- Noise level: 67 dB(A)
- Fan speed: 550 rpm
- Max capacity at 0 Pa: 48,500 m<sup>3</sup>/h
- Specific efficiency: 26.2 W/1000 m<sup>3</sup>/h
- Weight: 45 kg
- Controllable by DeLaval thermal control TC1



### DeLaval dairy fan DF1270

DeLaval dairy fan DF1270 can ventilate an entire dairy cow housing facility. The 127 cm fan provides optimal ventilation by moving air at a rate of max 33,000 m<sup>3</sup>/h. Installation at a minimum height of 2.7 metres and with a 10° to 15° angle provides optimal air flow in the barn, along the feeding table or in the holding area. The venturi incorporated in the fan housing accurately directs the airflow towards the cows and increases the effective distance at which air speed is high enough to keep cows cool. The device can tilt in increments of 5° for accurate control of airflow patterns.

This fan – easy to install, use and maintain – has a low noise level to help keep your cows calm, in a relaxed and comfortable environment.

#### TECHNICAL DATA

- Propeller diameter: 1270 mm
- Voltage/frequency: 3 x 400 V / 50 Hz
- Amperage: 2.5 A
- Power consumption: 0.88 kW
- Motor protection class: IP 55
- Noise level: 66 dB (A) at 7 m, 68 dB (A) at 5 m
- Fan speed: 410 rpm
- Max capacity at 0 Pa: 33,000 m<sup>3</sup>/h
- Specific efficiency: 39.1 m<sup>3</sup>/h/W
- Weight: 67 kg
- Controllable by DeLaval thermal control TC1

### DeLaval parlour fan PF142

DeLaval parlour fan PF142 is ceiling mounted in milking parlours to provide good air circulation. It also creates a wind speed that deters flies. During the colder winter months the fan recirculates the warm air generated by your cows from the roof space back down to operator level. During the summer, the operator will benefit from effective cooling and air removal without draughts.

This fan can be operated manually or be upgraded with an automated speed control. This option measures the temperature and automatically adjusts the fan speed to create an environment that is neither too cold nor too warm.

#### TECHNICAL DATA

- Propeller diameter: 1420 mm
- Power supply: 230 V AC / 50 Hz
- Amperage: 0.52 A
- Max power consumption: 110 W
- Motor protection class: IP 55
- Weight: 10.9 kg
- Max rotation speed: 265 ± 10% rpm
- Max capacity at 0 Pa: 43,400 m<sup>3</sup>/h
- Internal self-resetting thermal overload
- Optional variable speed control

# Heat stress and milk production



The effects of heat stress on the physiology, reproductivity and productivity of dairy cattle are well documented. The normal body temperature of a dairy cow is about 38.5° C. When air temperatures exceed about 22° C, cows begin to demonstrate signs of heat stress.

Indicators that cows are suffering from heat stress:

- Body temperature >39° C
- Respiration >80 breaths per minute
- Reduced activity
- Reduced feed intake >10–15 percent
- Reduced milk yield – down by 10 to 20 percent, or more

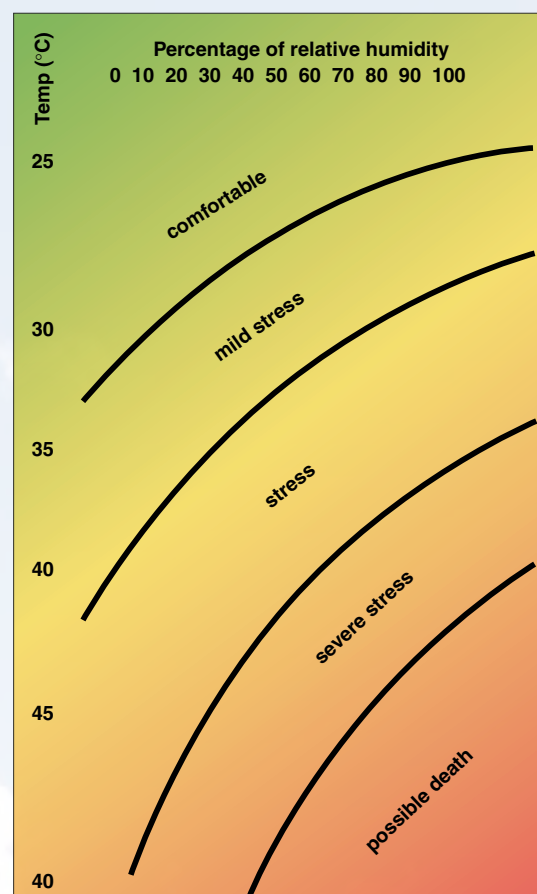
Where a cow's heat load lasts for an extended period, the effect on milk production can occur at a lower temperature than 22° C – milk yield can decrease by about 10 percent at just 20° C.

In these cases, it is the effect of the accumulated temperature and humidity levels over the previous 24 hours that determine the cow's level of milk production. For this reason, researchers have created a monitoring tool called the Temperature and Humidity Index for the last 24 hours (THI24h). As long as this index remains below 68, the cow feels comfortable.

Studies have shown that heat stress during late gestation reduces calf birth weight and subsequent milk production. Dry cows provided with shade gave birth to heavier calves and produced more milk than cows not provided with shade.

Reduced milk yield and reproductive rate bring economic losses to dairy producers. A number of steps can be taken to minimise the effects of heat stress. However, the methods of minimising heat stress should be appropriate to the dairy climate. Cow comfort should be the priority.

**Stages of cow heat stress in relation to temperature and relative humidity.**



Source: DeLaval 2006; *Efficient Cow Comfort* (adapted from Dunham, D. et al, *Coping with summer weather*).



### DeLaval thermal control TC1

A dairy cow exposed to acute heat stress reacts with increased perspiration and accelerated respiration. This makes her uncomfortable. After a period of time, she adapts to the warm climate by eating less. For a lactating dairy cow, a reduced feed intake will result in reduced milk production.

DeLaval thermal control TC1 is the mastermind behind DeLaval dairy fans. The intelligent DeLaval TC1 optimises cow comfort and provides better control over milk production. It does this by taking into account the barn's present temperature, the accumulated temperature over the previous 24 hours, plus relative humidity and the air speed from the dairy fans.

DeLaval TC1 controls DeLaval dairy fans based on the Temperature and Humidity Index for the last 24 hours (THI24h), which is a monitoring tool used to assess exactly when a cow's milk production starts to reduce due to heat stress. When the THI24h rises above 68 to 74, the cow starts to react to heat stress by producing less milk. The DeLaval dairy fans run for as long as the THI24h exceeds the selected comfort temperature – approximately 22° C.



DF1300 blade fixation



DF1270 calibrated propeller blades



DF1270 tilting device



TC1 display

#### TECHNICAL DATA

- Power consumption: Approx. 100W
- Protection class: IP 66
- Dimensions (H x W x L): 295 x 245 x 130 mm
- Weight: 3 kg
- Max. distance of unit from sensors: 75 m
- Temperature sensor: Only one sensor is needed together with DeLaval TC1
- Humidity sensor: Only one sensor is needed together with DeLaval TC1
- Suitable for DF1300, DF1270 and DF710



*DeLaval dairy fans keep the air around the animals moving, in order to prevent heat stress and optimise milk production.*



### Mechanical ventilation

Dairy animals need a clean, cool and dry environment with plenty of fresh air. They also need lower temperatures than humans. Proper ventilation, through the continual removal of heat, moisture and odours created by livestock, is the key to keeping your cows comfortable.

When the air temperature exceeds about 22° C, cows begin to display signs of heat stress. Milk production can also be negatively affected at a temperature even lower than 22° C if the cow is exposed to heat for a long period of time.

Milk yield can decrease by about 10 percent at 20° C.

These circulation fans can help by ensuring adequate air exchange and temperature-humidity control is maintained via thermal controllers.

Well designed barns with natural ventilation properly supported by dairy fans can provide an excellent environment for dairy cows.

DeLaval offers assistance in planning and designing complete dairy farms as part of our full range of solutions. When working with DeLaval in dairy farm planning, you can be confident that our design will be fully integrated with the right solutions for your local climatic conditions and milk production style.

