

Efficient pig breeding in Denmark

Background

Denmark, with over 25.7 million pigs produced in 2006, is one of the world's largest producers and exporters of pig meat (85% of the produced meat is exported, which amounts to 5.3% of the total value of Danish exports).

Family farms are common in Denmark and pig production is no exception, with some 7,800 such pig farms. The Thorupgaard farm, owned by Mr. Espen Dollerup, is located in the surrounding area of Farsø, in North Jutland; a region characterised by a mild and temperate climate: cool summers (mean temperature of 16 °C) and non severe winters (mean temperature of 0.5 °C).

The farm operation

Modern pig farming is highly specialized with frequent splits between where the pigs are bred and where the pigs are reared. The Thorupgaard farm is specialized in breeding sows, with the offspring of the sows being reared on other farms.

The production unit on the farm consist of 3 distinct but connected buildings. The sows are moved from one building to another depending on their stage of gestation. Having the buildings connected makes this process very easy. During the whole reproductive cycle it is crucial to keep the environmental parameters of the various structures under tight control. This allows for maximum breeding efficiency of the sows.

The problem

Each ventilation system is dimensioned to supply both minimum and maximum ventilation. Minimum ventilation is the volume of air that needs to be

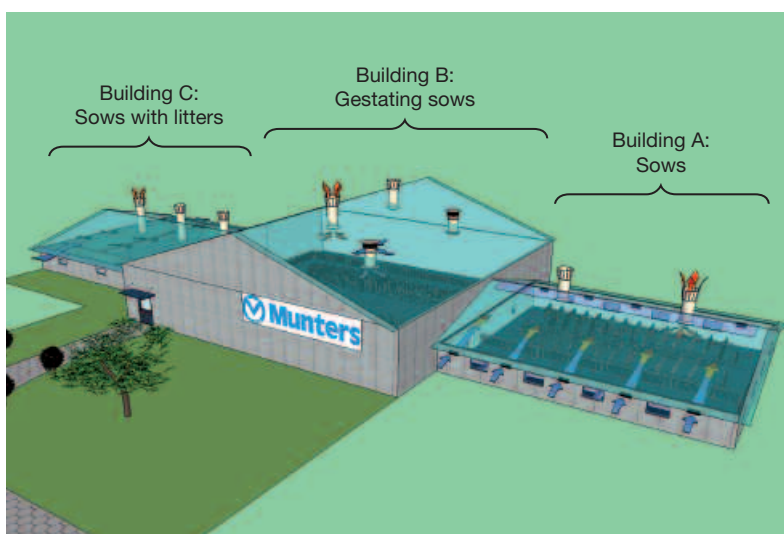
HUMICOOL: Case study, Pig breeding, Thorupgaard farm, Denmark



FACTS

With Munters livestock ventilation system, Thorupgaard's farm achieved:

- airflow patterns that will not cause any disturbing animal behaviour
- a proper supply of both minimum and maximum ventilation
- prevention of heat and moisture build-up
- removal of carbon dioxide, ammonia, odours and dust



An overview of the three farm units.

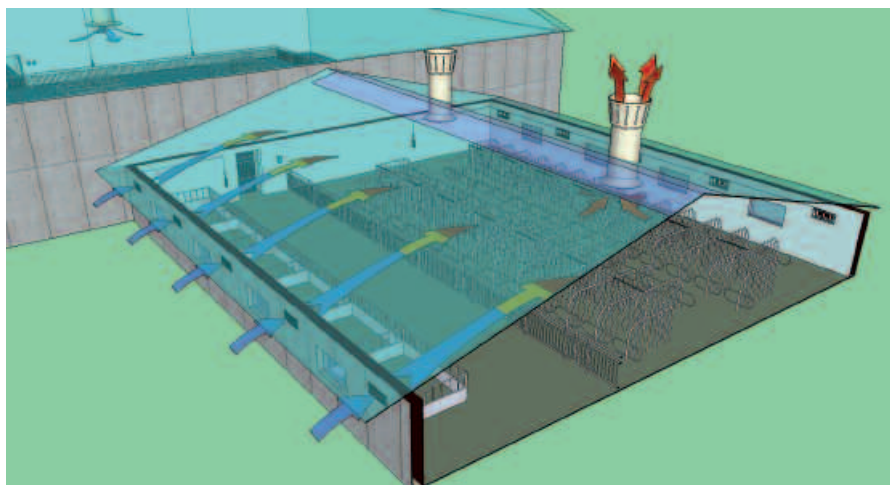


supplied to the animals for maintaining a proper air quality, which means prevention of heat and moisture build-up; removal of carbon dioxide, ammonia, odours and dust. All of these parameters can influence the animal's performance negatively if left uncontrolled. Maximum ventilation is the quantity of air that needs to be passed through the building to remove any excess heat produced by the animals.

The solution

Each of the 3 buildings on the Thorupgaard farm posed unique design challenges in terms of structural design and environmental conditions. To guarantee a proper functioning negative pressure ventilation system, the design team evaluated parameters such as:

- Type, number and weight of the animals in each structure
- State of the animals (gestating or with litters)
- Climate conditions of the region
- Insulation of the building



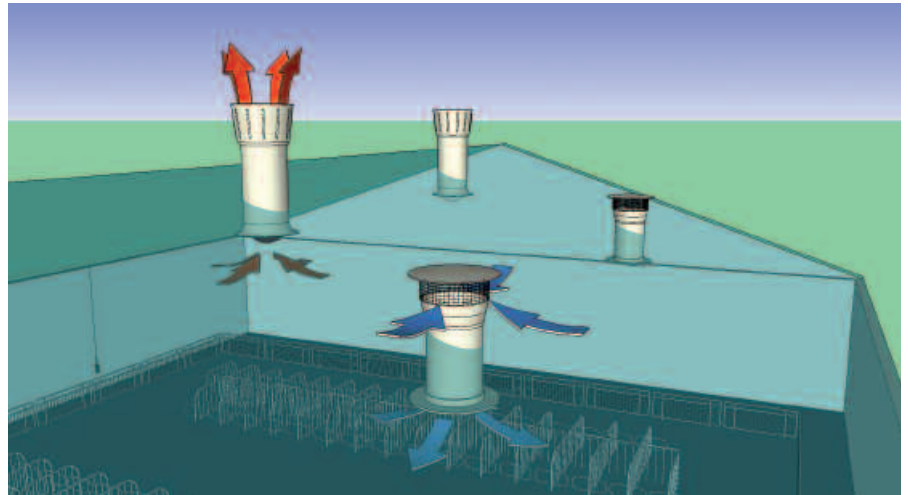
The illustration shows building A where the air enters the IW wall inlets and is exhausted via two Euroemme® TU chimney fans on the ridge of the roof.

Thanks to sophisticated software and the extensive experience of Munters in livestock ventilation, a design for each of the buildings was suggested to Mr. Dollerup. The design not only specified the right equipment to deliver the air-flow requirements, but also the right equipment to ensure airflow patterns that will not cause any disturbing animal behaviour.

There are three buildings housing sows, gestating sows and sows with litters, each requiring a customized solution.

Building A

In building A there are normally 340 sows weighing an average of 175 kg. The building measures 44x18 m and the sows are housed in crating inside an open structure. Following the architecture and dimensions of the building it



A view of building B featuring the IS roof inlets incorporating the Star diffuser and two Euroemme® TU chimney exhaust fans.

the fresh air gradually warms up as it penetrates the building before it descends down to the animals to replace the stale air. During summer periods the IW inlets are opened larger and the fresh air penetrates the structure directly.

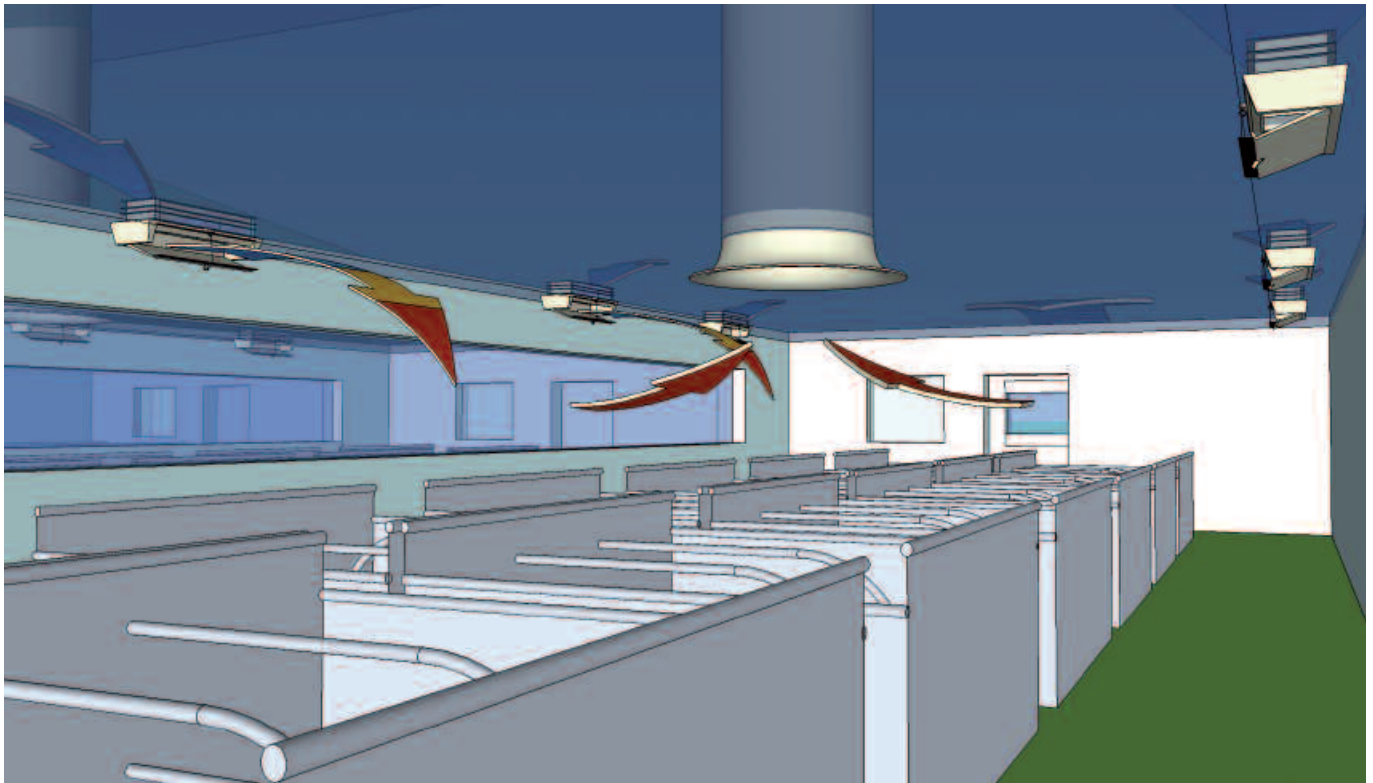
Building B

Around 240 gestating sows weighing over 175 kg each are housed in building B measuring 24x26 m. The solution was to use a combination of 4 Munters IS roof inlets with patented star diffusers and 2 Euroemme® TU chimney exhaust fans.

The unique design of the “Star diffuser” distributes cold incoming air horizontally and radially which allows for the cold fresh air to mix with warmer air before it descends onto the animals. During summer periods when the inlets are opened larger, the fresh air is directed downwards onto the animals, assisting with cooling. Once again a Munters CCL5000 master controller was used to regulate the functioning of all the equipment and 2 Munters LA actuators were used to control the opening of the star diffusers on the IS inlets and dampers on the TU fans.

was possible to utilise 30 Munters IW wall inlets installed in the long side walls and 2 Euroemme® TU800 chimney exhaust fans installed along the ridge of the roof to form an effective ventilation system. The opening of the IW inlets and the dampers on the TU fans are manipulated by using Munters LA actuators. The complete ventilation system is controlled by a Munters CCL5000 master climate controller.

During cold periods, the IW inlets direct cold incoming air along the ceiling and by utilising the Coanda effect



In building C the IL loft inlets and the TU chimney exhaust fan are designed to provide a uniform air distribution and to prevent drafts over the sows and piglets.

Building C

Building C consists of a number of independent rooms, each housing 48 sows and up to 480 piglets and measuring 22×12 m. The challenge posed here is to provide a uniform air distribution in a small area and to prevent any drafts over the sows or piglets. The chosen solution was to use 16 Munters IL loft inlets in combination with 1 Euroemme® TU800 chimney exhaust fan. The IL inlets are

installed along the long walls of the room and direct air along the ceiling towards the middle of the room. They draw air from the loft, where cold air is already tempered in the winter by the rising heat from the animals below. The TU exhaust fan is installed in the centre of the room. Once again the inlet opening is manipulated by a Munters LA actuator while the TU fan is fitted with a

damper motor for the manipulation of the damper opening. Each room is independently controlled by a CCL5000 master climate controller.

All the CCL5000 master controllers are networked to a CCL5000 centre controller from which Mr. Dollerup can easily get an update of all the various rooms or make adjustments without taking a tour of the whole facility.



Building A with the IW inlets mounted on the side wall.



Building C with the IL inlets mounted in the ceiling along the wall.

The result

The competing offers Mr. Dollerup received all pleaded for equal pressure ventilation, which is more costly to install, run and maintain.

Munters negative pressure installation in all 3 sections has proven a perfect distribution of air even during cold periods, something which was Espen Dollerup's greatest concern prior to the installation. "During the operation period the ambient temperature has from time to time been down towards -20° and the system has performed excellent-

ly", Mr. Dollerup declares. "Even throughout the warm summer season the system capacity and efficiency have come up to all expectations and we have had no mortality due to heat stress" he continues.

Espen Dollerup was pleasantly surprised of the low maintenance and cleaning requirements of the ventilation equipment since it was taken into operation.

The production results at the farm have ever since the start up of the climate control system been in the lead of the Danish pig producers. "We are at 30-31 pigs per sow and year", Mr. Dollerup says, not entirely without pride. (The Danish average is at 25 pigs per sow and year). "That kind of result requires everything to run at absolute perfection, the staff, the feeding system and not least a well performing ventilation system", Espen Dollerup concludes.



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