The first air cleaner for poultry with 80% ammonia reduction

by Dr Merete Lyngbye, Application Manager, Munters Europe AB, PO Box 1150, Isafjordsgatan 1, Kista Entre 164 26 Kista, Sweden.

Several companies have developed air cleaners for the swine industry. However, the challenge of developing an air cleaner for the poultry industry has not been to reduce the ammonia concentration, but rather to develop an air cleaner that can handle large amounts of dust and is easy to clean and maintain.

Dust concentrations are higher in poultry houses than in pigs, and the dust is greasier.

Munters installed two vertical air cleaners in a broiler house and in a layer house similar to those earlier installed in pig houses.

While at the pig house, cleaning of the air cleaner only became necessary every six months, the poultry units required cleaning far more often. That caused Munters R&D department to, literally, turn the problem with clogged filters upside down or at least to see it from a different angle. Rather than a vertical air cleaner it was now put down on its side.

Furthermore, a droplet separator section can be pulled out and cleaned with a traditional high pressure cleaner from outside.

It is no longer necessary to enter the air cleaner to clean filters. All in all, the air cleaner improved the working environment for the farmer dramatically.

MAC benefits

Compared to other air cleaners, the Munters Air Cleaner (MAC) has the following benefits:

- **No filters.**

There are no filters which can become blocked. The ammonia is caught in a mist. Munters is the only company that produces large central air cleaners without filter material. Other chemical air cleaners have plastic filters which are sprinkled with liquid that captures ammonia, plastic filters get blocked and are difficult to clean in poultry houses.

- **Most effective.**

It can perform the most efficient ammonia reduction for poultry houses worldwide together with easy maintenance.

- **Droplet separators.**

Droplet separators are used to separate the fluid droplets from the airstream. Munters owns factories in Germany, which produce droplet separators for gas treatment in other industries, and Munters possess great expertise in this field. The droplet separators are much easier to wash when compared to filters.

- **Cleaning from outside.**

The droplet separators can simply be pulled out and cleaned with a high pressure cleaner outside the cleaner box.

So, rather than washing the droplet separators inside the air cleaner, the extraction system will improve working conditions for farmers to maintain the facility.

Munters is the only company offering this extraction system for agriculture.

- **Plug and play.**

The air cleaner works as soon as it is put into operation (plug and play). This means that the farmer can wait to start the air cleaner, for instance day 14 after the flock is delivered to the house (ammonia emission is negligible with young birds).

There is no biology to be established and maintained as with bio filters.

- **Disinfection.**

The air cleaner will not be harmed by disinfection of the houses. It is a chemical air cleaner and there is no microbiology, which can be destroyed.

- **Keep it simple.**

The air cleaner has a simple construction, which makes it simple to maintain. The motto 'Keep it simple' has been instrumental for Munsters' R&D department.

Partial air cleaning

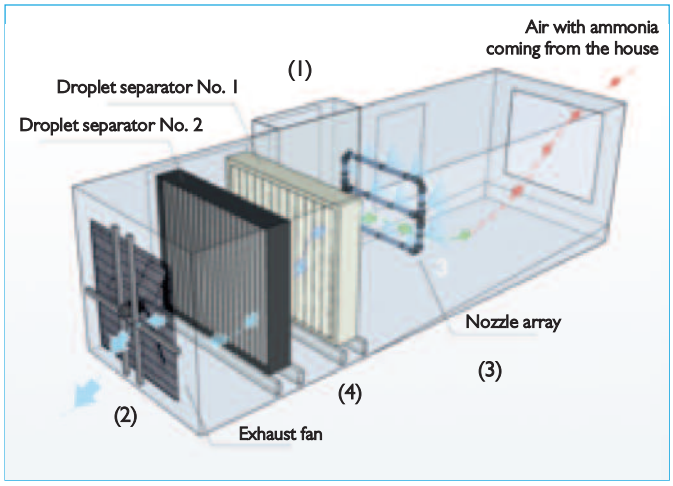
It is not necessary to clean all the air from a poultry house. In colder regions you will get a huge ammonia reduction, even if you just clean a part of the exhausted air.

But what exactly is partial air cleaning and why do we get a huge reduction when we only clean a part of the air?

Continued on page 28

A poultry layer house.

Fig. 1. Munters air cleaner consists of a fully contained box (1). At one end there is a fan (2), that extracts air from the house through the air cleaner. The air cleaner begins with a set of nozzles (3) spraying a mist of liquid droplets with a low pH level. When the ammonia-contained air from the house is passed through the mist of liquid droplets, the ammonia molecules react with the droplets, which then subsequently fall to the bottom of the box or get caught in the droplet separators (4). In this way the ammonia is separated from the air in the house before it is emitted into the open surroundings. The liquid from the nozzles consists of water and sulphuric acid with a mixing ratio of 0.05%. The two droplet separators can be pulled out and cleaned with a high pressure cleaner outside the actual box.



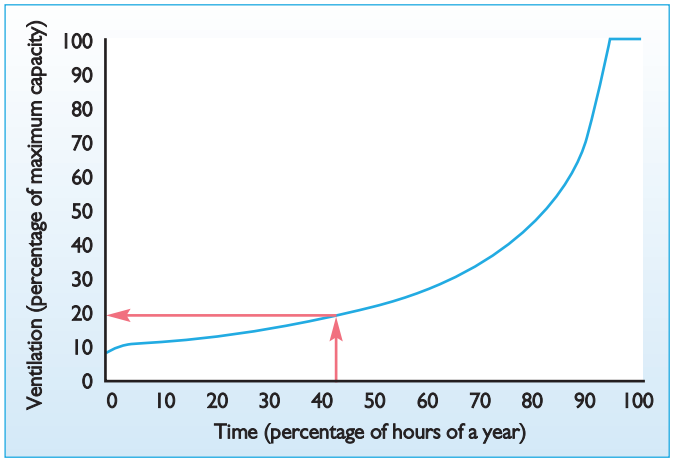


Fig. 2. Yearly ventilation rate in a layer house. Over 40% of annual hours, the ventilation rate is less than 20% of the maximum ventilation capacity in a layer house in Denmark (desired room temperature in house 21°C and 10m³/hour/bird.)

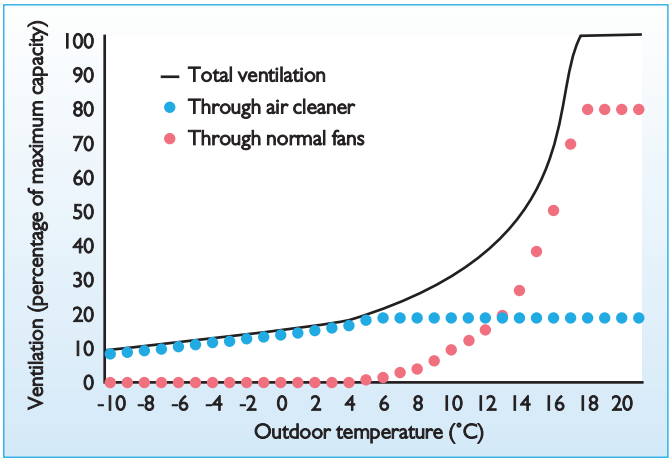


Fig. 3. Ventilation rate at various outdoor temperatures in a layer house. The black line illustrates the total ventilation rate in the house. The blue circles illustrate the amount of air exhausted through the air cleaner. The air cleaner has a maximum capacity of 19-20% of the total ventilation capacity from the layer house. The remaining fan capacity is illustrated by the red circles. The graph shows that the traditional extraction fans do not start running until the outdoor temperature reaches 5-6°C.

Continued from page 27

Well, as previously stated – only a portion of the exhausted air is cleaned during partial cleaning. This means, initially all air from the house is exhausted through the air cleaner.

But as the outside temperature gets warmer and the animals get bigger the fan in the air cleaner does not have sufficient capacity to maintain the desired temperature in the room, then the other fans in the house will start to run.

Let us take a layer house in northern Europe as an example. If the desired room temperature inside a house is 21°C and the total ventilation capacity is 10m³/h per bird, the ventilation will be running under 20% of full ventilation capacity for 40% of the yearly running time.

This means that if you install an air cleaner to this house, which cleans the first 20% of the exhausted air; all air in the building will pass through the air cleaner for 40% of the yearly running time. This is illustrated in Fig. 2.

By leading the first 20% of the exhaust air from a layer house through the air cleaner with a cleaning efficiency of 80%, around 58% of the total amount of nitrogen that is normally discharged through the chimney is collected.

For example, if the annual ammonia emission from the chimney is 3,560kg ammonia from a layer house with 13,000 birds, the air cleaner can thus accumulate 2,060kg ammonia.

The ammonia is then collected in a tank and can be later used as a fertiliser. ■