

# Closed combustion heating systems for poultry houses

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In the agricultural market energy saving is one of the most important cost reduction factors.

Together with Winterwarm Heating Solutions, two students in Animal Husbandry and Animal care of the HAS College, in Den Bosch, The Netherlands, have performed research on the differences in energy consumption and bird performance, when heaters with closed combustion are applied, and when traditional heaters, with open combustion are applied.

The results of the research showed that appliance of closed combustion heaters can realise significant energy savings.

In most European countries a general directive is valid which allows a maximum of 3000ppm carbon dioxide in the poultry house.

When heaters with open combustion are applied, this is hard to realise while the heaters bring a lot of carbon dioxide in the house which should all be ventilated to the outside. During this process a lot of the produced heat gets lost.

On the contrary, when heaters with closed combustion systems are applied there is no need for such high ventilation volumes, and the produced heat will remain in the house.

**Erik Boode is very satisfied with the two DXC heaters in his new poultry house.**



The DXC 80 heater.

As a result the energy consumption will decrease considerably.

In addition, the second, also important consequence is that the humidity in the combustion gases is transported outside, which results in a drier climate with drier litter.

## Research trials

The research was carried out at two locations – at Schothorst Feed Research in The Netherlands and Stickford Farm in the UK.

In the UK the closed combustion DXC heaters from Winterwarm were compared to 66kw Boxer

heaters with open combustion. In the Netherlands the Winterwarm DXC heaters were compared with Winterwarm ECO-heaters, also with open combustion.

During the research different measurements were made:

- Carbon dioxide.
- RV.
- $T_i$ .
- Gas consumption.
- Bird performance.
- Weight.

The ventilation at both locations was controlled on the basis of the carbon dioxide concentration in the poultry house.

## Energy consumption

The carbon dioxide production in the poultry house is very low during the first 10 days of a round.

Therefore, when closed combustion heaters are applied, the ventilation level can be kept to a minimum level. During this period the main part of the energy savings are realised.

At the dutch location energy savings of 12% were measured, and at the UK location between 24% and 37%.

These findings are also confirmed by other research on this subject. Kruczek, 2005 indicates savings between 15% and 23%. Löffel 2010 and De Baere and Löffel 2011

showed 12% and 34% energy savings respectively.

The reason that the energy savings at Schothorst in the Netherlands were relatively low can be due to the mild winter during the research period and the relatively unfavourable meteorological location of the poultry house.

At the end of the research it was also concluded that the way the ventilation is realised (manually or computer controlled) very much affects the actual energy savings.

If this is not realised very precisely (based on the maximum 3000ppm) then too much air is ventilated, and the energy savings will decrease.

## Bird performance

The research concerning bird performance has not produced any significant differences. Weight and mortality rate remained at the same level.

Although expectations were that this type of heating would result in a positive effect on bird performance, the conclusion was that there are too many other factors which also influence the measured data.

The researchers, Lars Noordam and Sabrina van de Kraats, state that more extensive research over more rounds is required to really be able to conclude anything scientifically.

## Satisfied users

Although the above mentioned factors are very important in order to determine whether to invest in a closed combustion heater, the day-to-day use of these heaters is also very important to the farmer.

The farmers who decided to install Winterwarm DXC heaters are very happy with the decision they made. The heater is well accessible from each side and can easily be cleaned after each round.

At the back of the heater there is a switch to put the heater in to ventilation mode. The low noise level they experiences when they are at work in the house is also very comfortable. ■