

Particulate matter is not a particularly nice matter

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The air in modern poultry barns contains high concentrations of dust particles including endotoxins and microorganisms. When inhaled these form a health risk for local residents. Wageningen University & Research conducts research into the sources of dust and developed methods to measure the dust concentration, and is now developing technical measures to reduce emissions. We also investigate how dust particles spread outside the barn, the exposure to local residents and which health effects are related to this.

What is particulate matter?

Particulate matter (PM) is a collective name for particles in the air that pose a health risk, especially if they also contain endotoxins - residues of dead bacteria - and microorganisms. The abbreviation PM_{10} indicates that the particles are smaller than 10 micrometers. In addition, there are particles smaller than 2.5 micro meters ($PM_{2.5}$). These very fine particles penetrate deeper into the lungs than PM_{10} . The dust particles from livestock farming are generally larger than $PM_{2.5}$. The measures are therefore primarily intended to reduce PM_{10} emissions. Manure and feathers are the main sources of dust in poultry. In pigs these are manure and skin flakes, and in cows manure, bedding material and feed.

Dust reduction in poultry houses

Wageningen University & Research developed a special measuring method with which they determined the particulate matter emissions for various barn types for chickens, pigs and cows. Especially poultry barns emit a lot of dust, partly as a result of the introduction of free-range systems for laying hens.

Subsequently, in a five-year research program a range of reduction techniques has been developed, tested, and validated with measurements in commercial stables.

Most measures are downstream techniques. They clean the air before it leaves the barn. So they do not remove the dust in the barn itself.

In addition, there are two measures that clean the air in the barn. These two also have a positive effect on the health of the animals and the poultry farmer. For the national government as well as the 'Food Valley' municipalities, we are currently looking for ways to reduce the dust emissions from barns. We look at both new techniques and possibilities to improve existing techniques.



*Photograph Kees Rutten
Measuring particulate matter emissions of stables in collaboration with the Institute for Risk Assessment Sciences of Utrecht University.*

Dispersion of endotoxins

Since 2014, Wageningen University & Research has been working together with other research institutes to determine the amount of endotoxin in barn dust, and on a computer model that predicts the dispersment of the endotoxins around stables.

With this model, we will examine how the predicted endotoxin concentrations for specific locations are related to the health effects found in local residents. In addition, we test whether the predicted concentrations correspond to reality.



Contact

Wageningen Livestock Research
P.O. Box 338
6700 AH Wageningen, The Netherlands
www.wur.eu/livestock-research

Albert Winkel
T +31 (0)317 48 04 91
E albert.winkel@wur.nl