59th Annual EAAP Meeting Vilnius, 24 – 27 August 2008

Session 5

J. Hartung, J. Schulz, J. Seedorf

Dispersion of bacterial emissions from a broiler house (Staphylococci as indicators)


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Dispersion of bacterial emissions from a broiler house

(Staphylococci as indicators)

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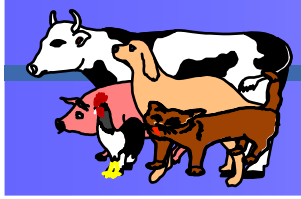
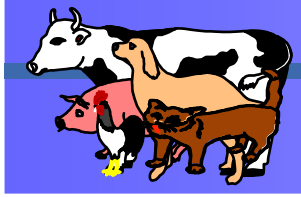


Background

The air in broiler houses contains a large variety and high amounts of **AERIAL POLLUTANTS** such as gases, dust and micro-organisms which give increasingly cause for concern to compromise not only

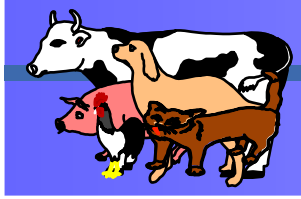
- the respiratory health of the animals kept in confined houses,
- the health of farmers working regularly in this atmosphere but also that ***EMISSIONS*** may impair
- **the health of residents living in the vicinity of farms,**
- **the health of poultry flocks in nearby farms**

<u>However:</u> Little is known about the dispersion, viability and travel distance of micro-organisms outside farm buildings.



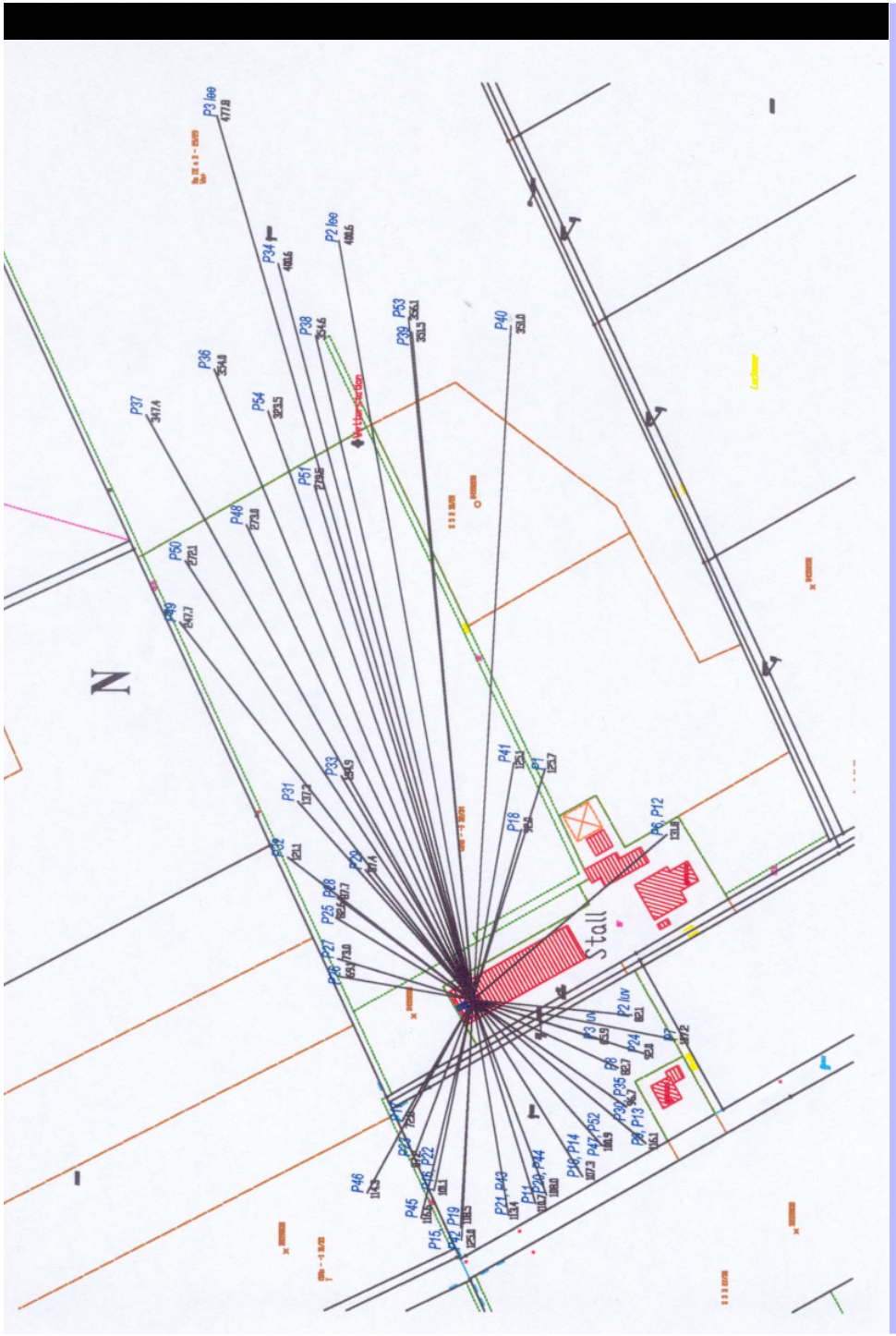
Air pollutants in broiler barns

Gases	Ammonia, hydrogen sulfide, carbon dioxide, methane, nitrous oxide, 136 trace gases, osmogens
BACTERIA	100 to 1000 CFU per litre of air 80 % Staphylococcaceae/Streptococcaceae
Dust	e.g. 10 mg/m³ total dust (broiler house) organic components up to 90 %, *antibiotics*
Endotoxins	e.g. 5 µg/m³ (broiler house)



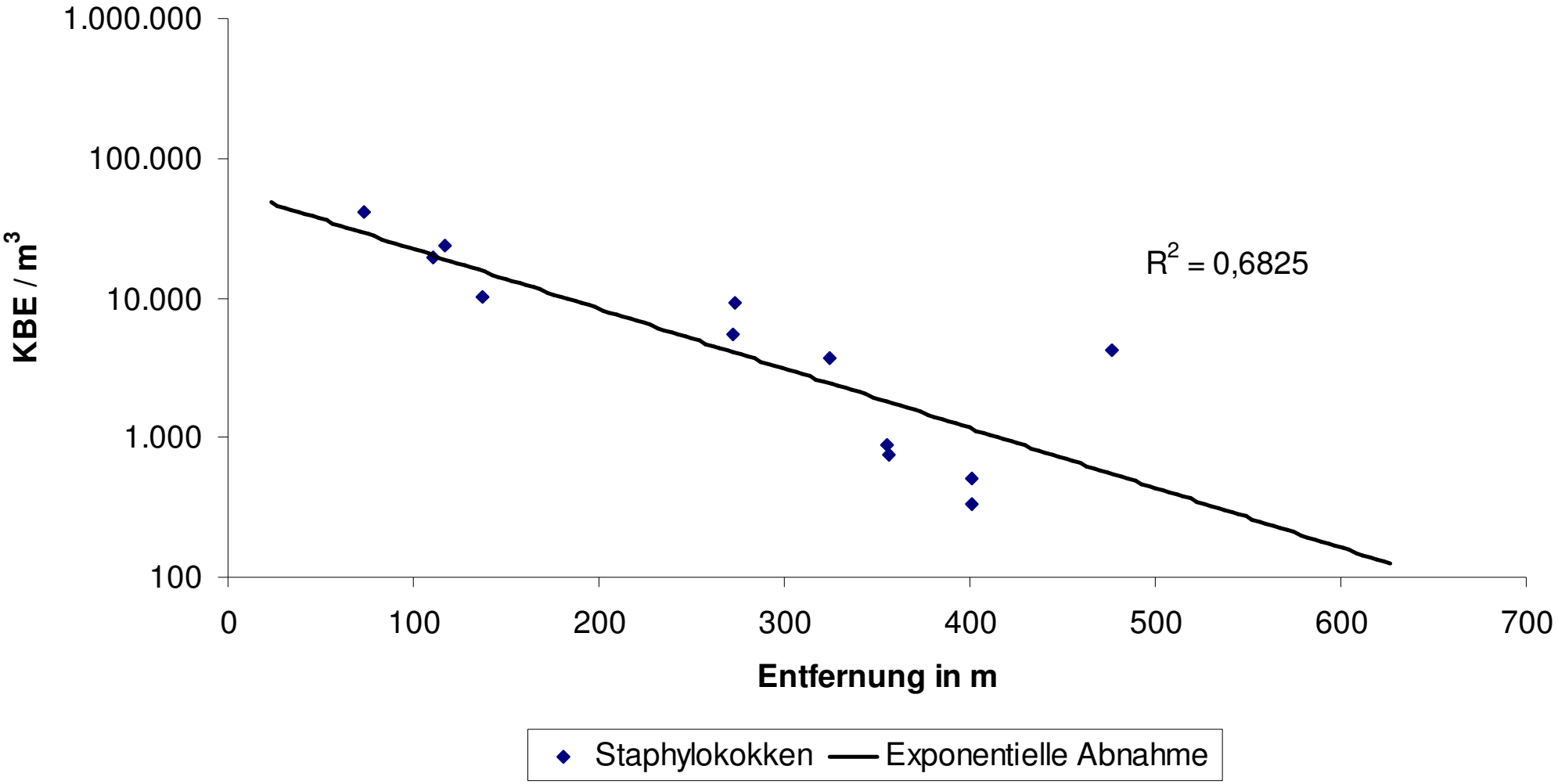
Sampling place downwind the barn

Sampling in the exhaust air of a broiler barn



Sampling positions and distances in the surrounding of the forced ventilated broiler barn.
Emission point upper end of ventilation chimneys.

Measurements always in parallel up-wind and down-wind the barn



Decreasing concentrations of *Staphylococcae* in main wind direction from the broiler barn. Sampling height 1.5 m above ground. Age of the animals in the barn at least 14 days. Outside temperature > 16 °C, wind speed between 1.7 m/s and 6.3 m/s. n = 12.

Conclusions

- ***Staphylococcae*** **seem to be a good indicator for bacterial emissions from broiler barns, emission amounts can reach 10^{12} cfu/h.**
- **The measurements show that they are found in 500 m from the source in significant amounts.**
- **Dispersion models can help to characterise the spread of bacteria. However, background measurements are still necessary to give proof of specific micro-organisms and ambient concentrations.**
- **Meteorological conditions have a considerable impact on the dispersion.**
- **More research is necessary in order to understand the mechanisms of loss of viability and infectivity during the dispersion processes.**
- **Presently the combination of measurements and dispersion models is necessary to give an estimate of a „safe distance“.**


THANK YOU FOR YOUR ATTENTION