Bird or manager – who is liable for dust and ammonia in layers stables?

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What is done?

Measurement of the air quality in the stable

- Concentration of gas, dust

Measurement of the emission from the stable

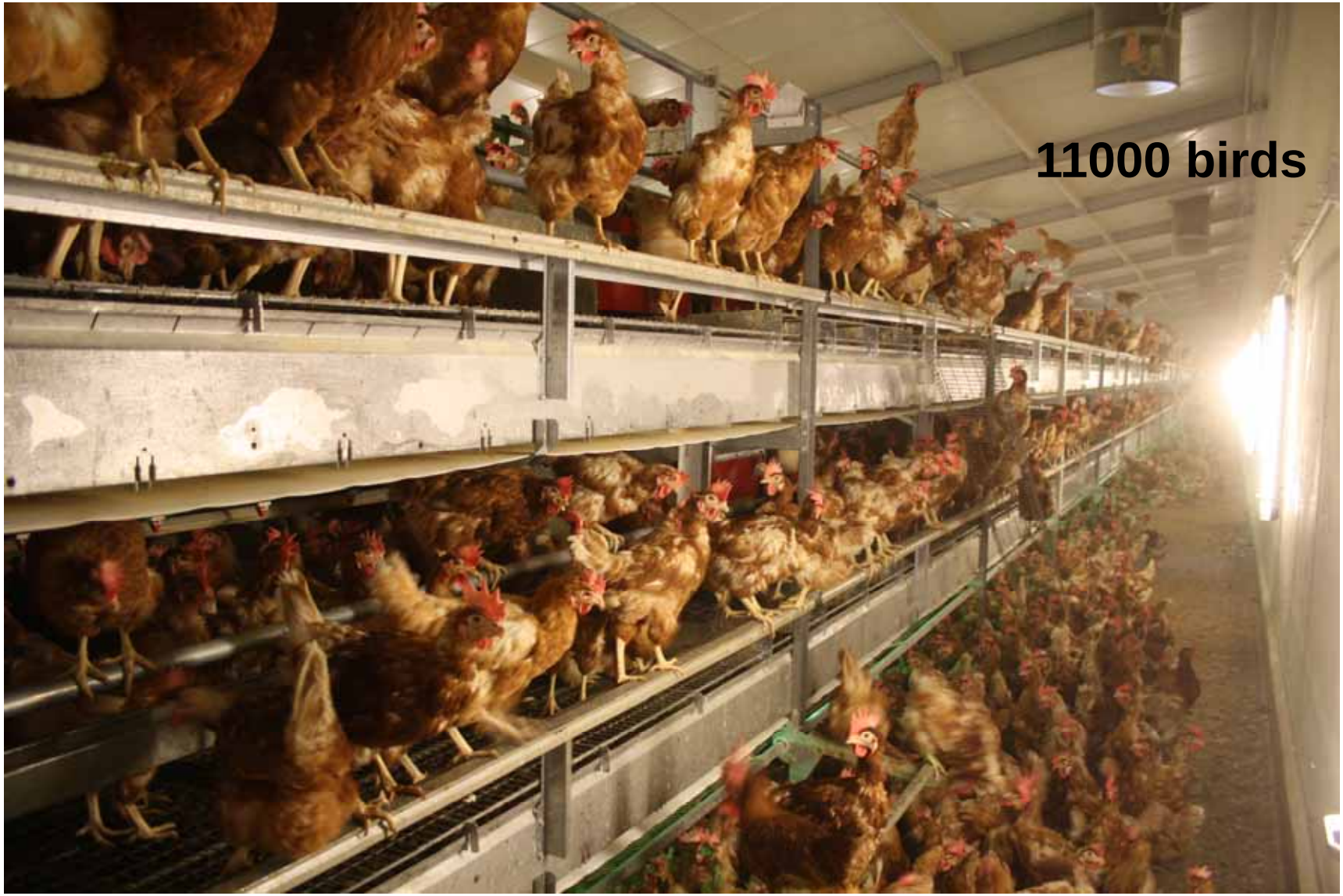
- Mass flow of gas and dust

Where is it done?

Number of stables: 72
North: 27
Middle: 22
South: 23

First visits: 61
Measurements done: 12

Who are the player?
Hens in aviary…



…and
hens in small group keeping

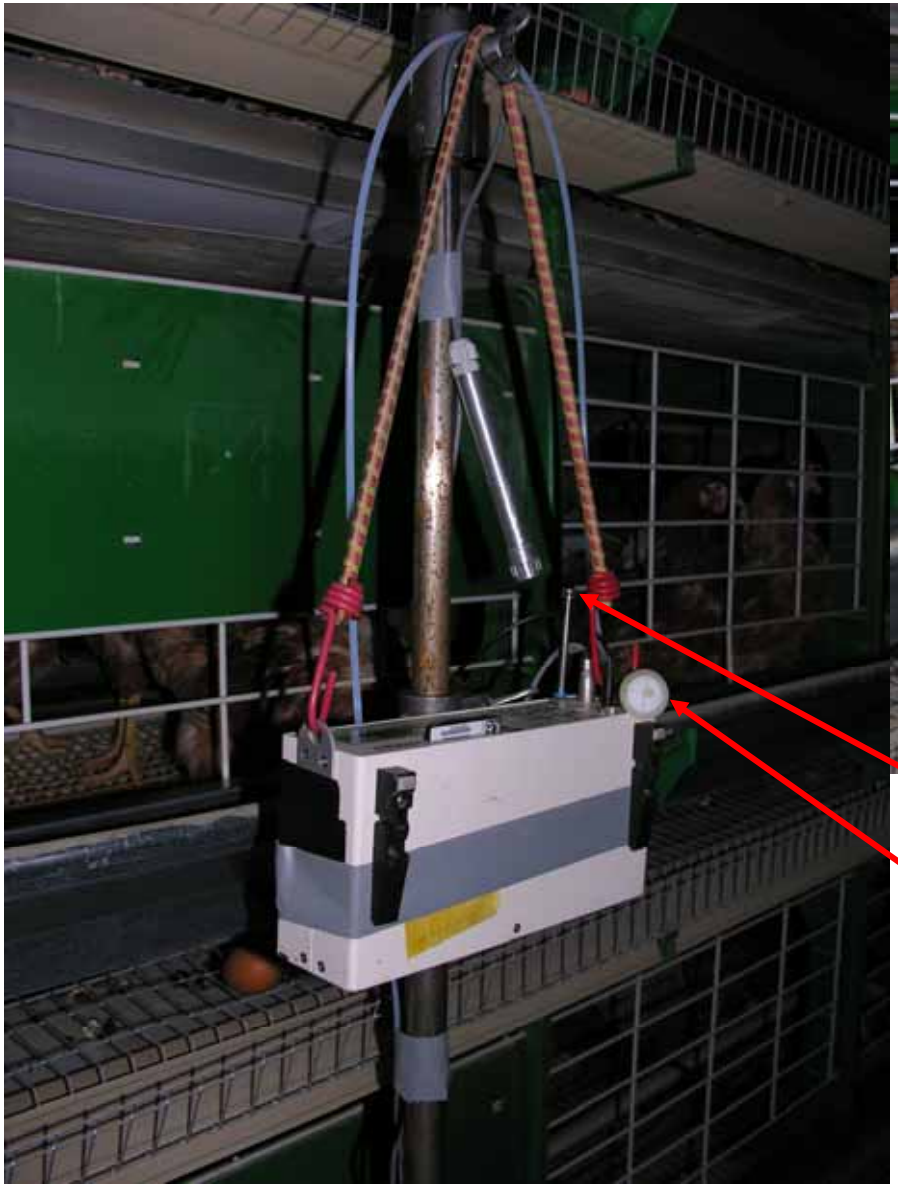
Factors influencing airquality in the barn

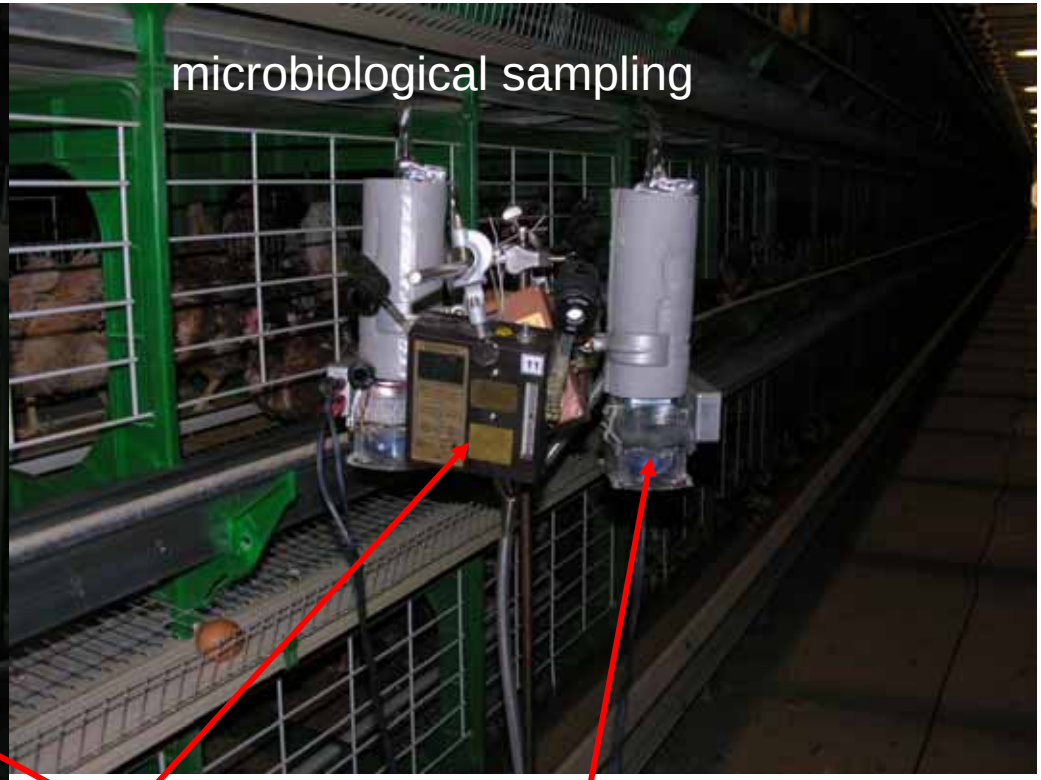
- Keeping system

Internal source	dust	ammonia
litter	++	+
manure belt cleaning	+	++
sand bath	++	o
lighting program	++	o

- Birds and Farmers activity

How it is done?
Measurement setup: air quality



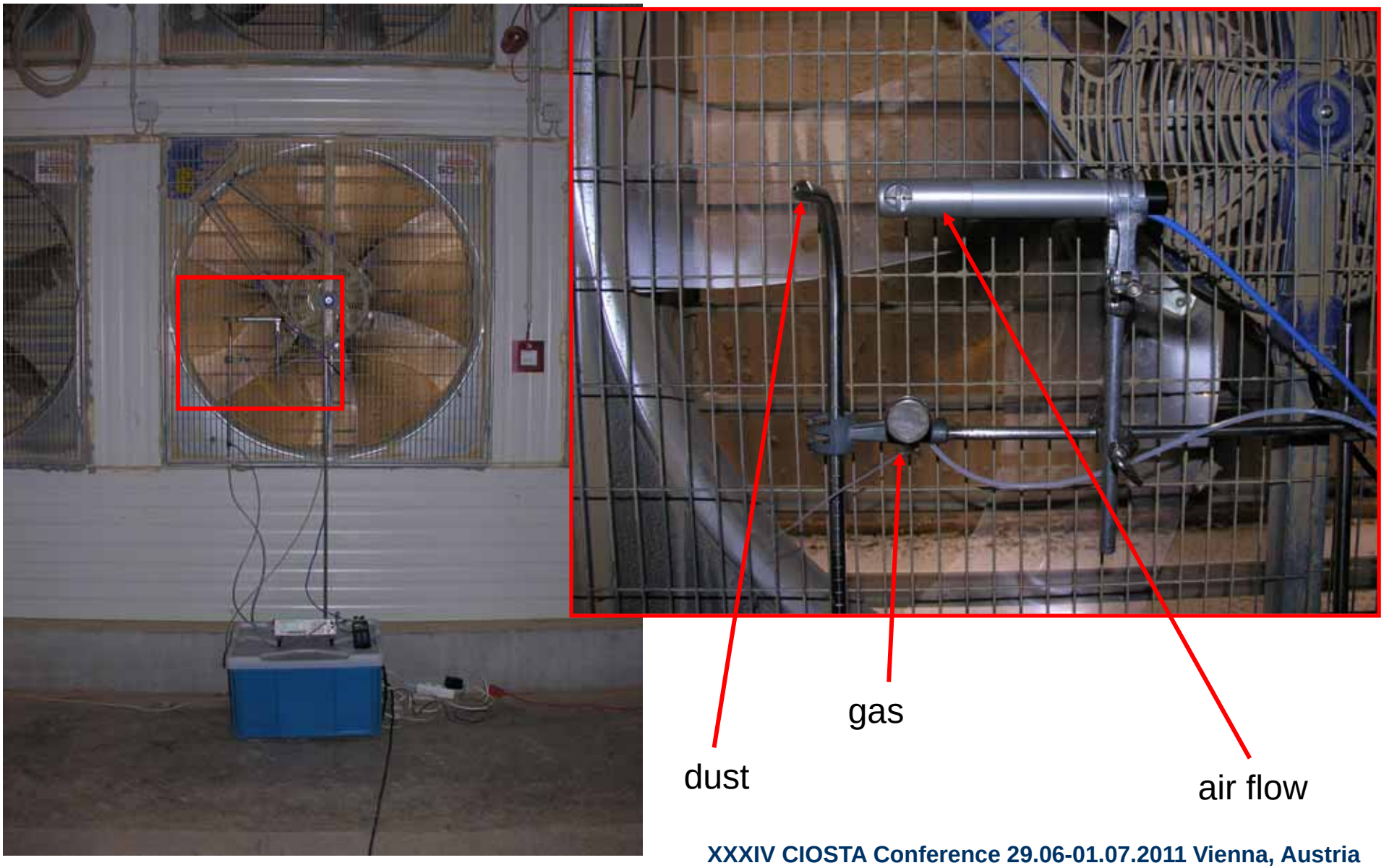


dust

germs and bacteria

gas

How it is done?
Measurement setup: emission

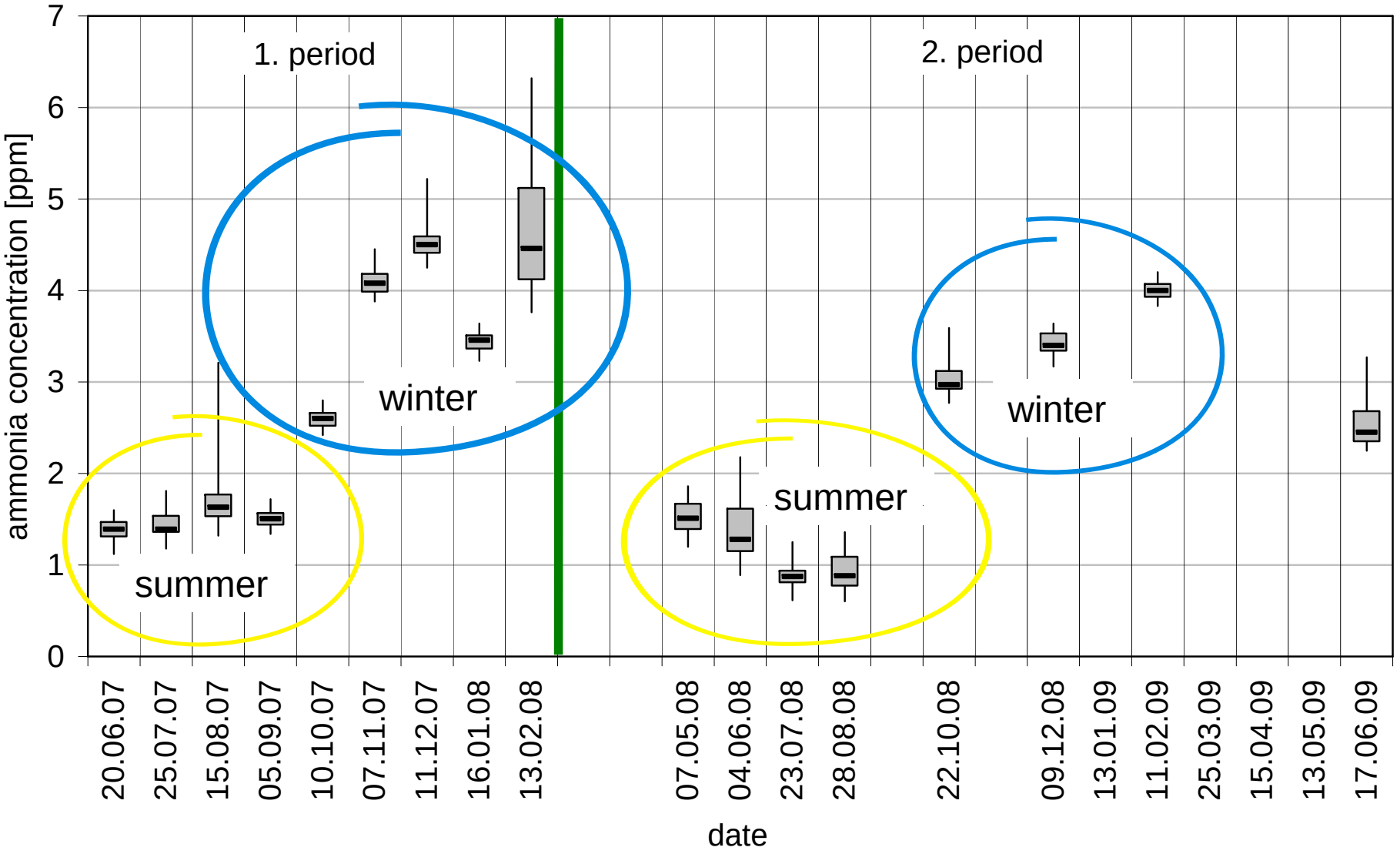


Measuring equipment at a glance

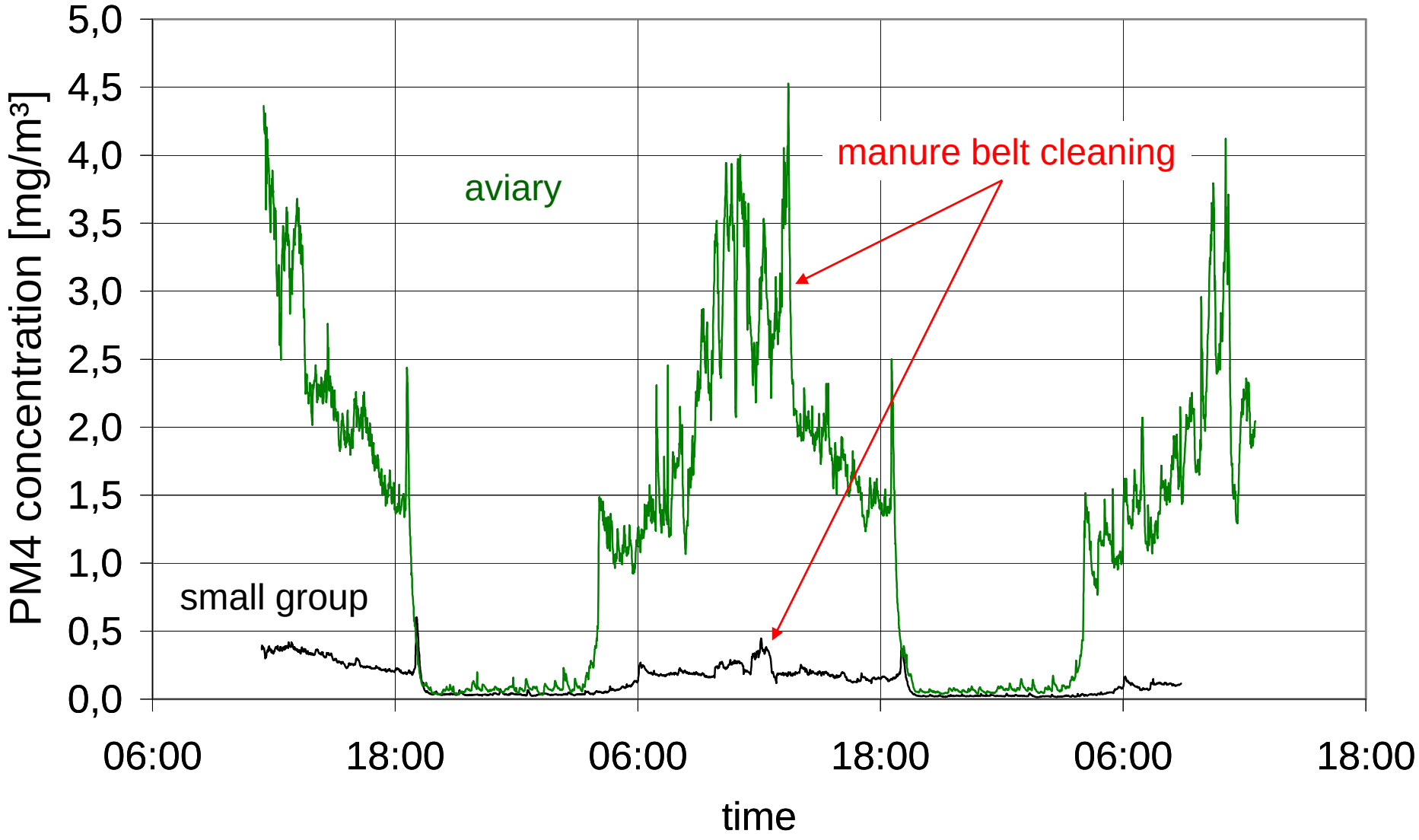
measuring	instrument	principle
ammonia	Innova 1302 multi gas monitor	opto acoustic
ammonia	Innova 1312 multi gas monitor *	opto acoustic
12-channel monitoring system	Innova 1309 multi point sampler *	electronic valves
PM10, PM4, PM2,5	Grimm optical counter 1.105 and 1.108	light scattering
air flow	Hoentzsch anemometer fan wheel	anemometry
air flow	Reventa anemometer fan wheel *	anemometry
density	Pyknometer 50 ml	physical
temperature, rel. humidity	Weatherstation	Pt100 and capacitive sensor
temperature, rel. humidity	Tinytag Ultra *	NTC thermistor and capacitive sensor
pressure	Fischer barometer *	aneroid

* - equipment of SMUL

Seasonal influence of ammonia concentration in the small group



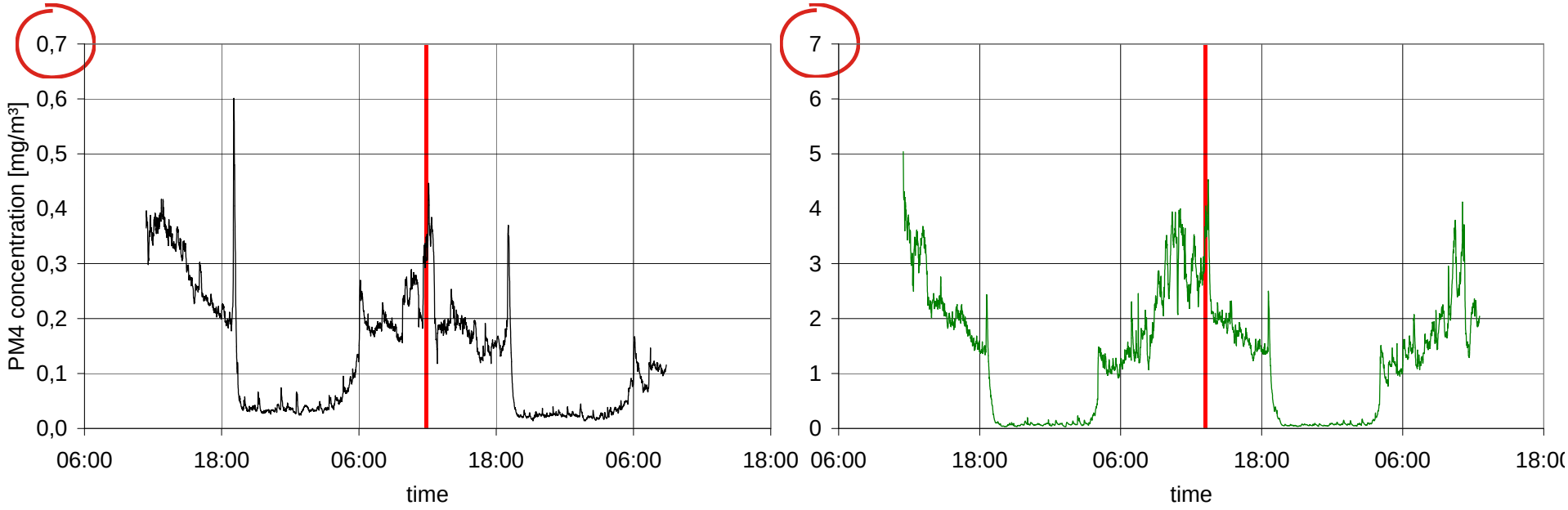
48 hours´ course of PM4 concentration in the both systems



48 hours´ course of PM4 concentration in the both systems

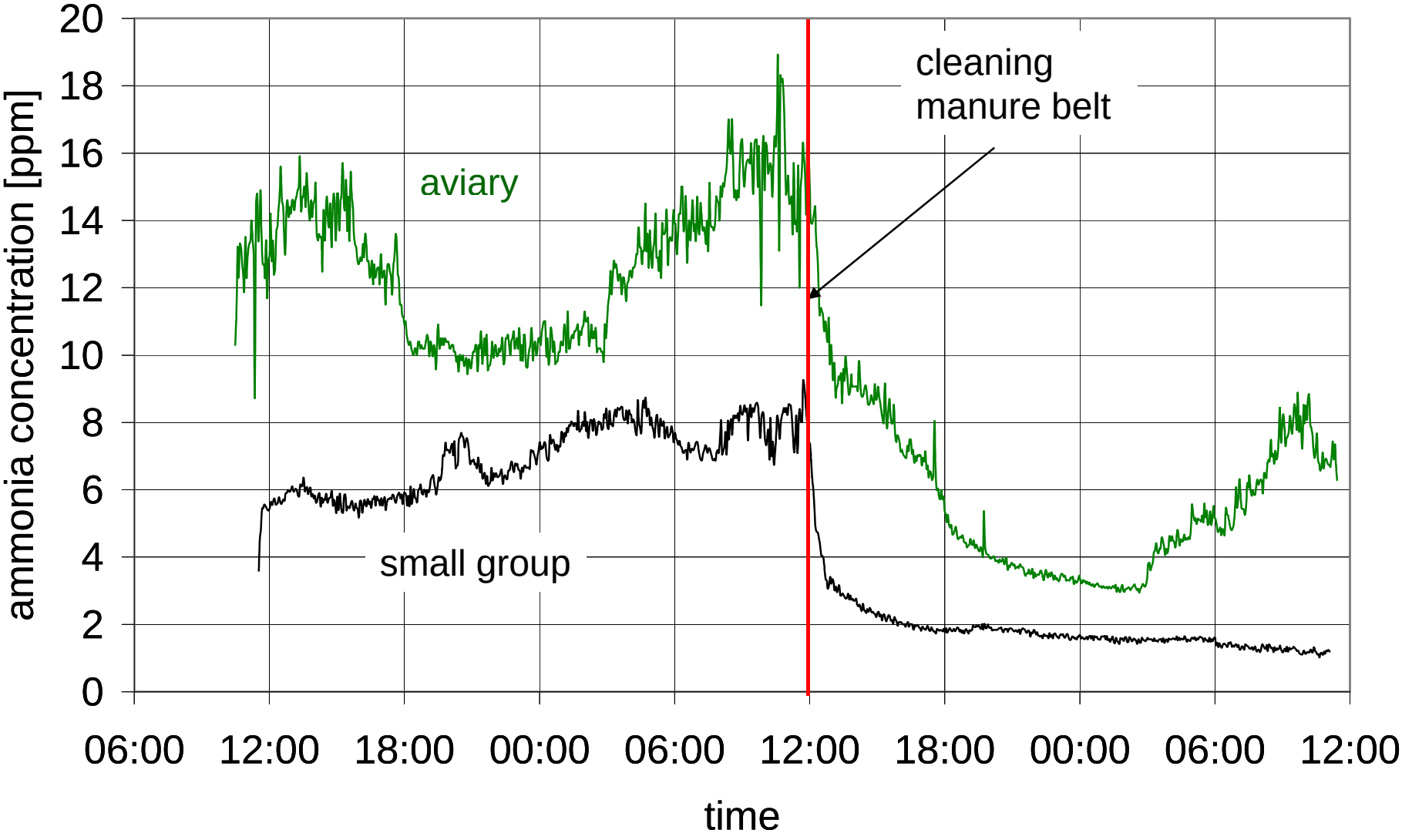
small group

aviary



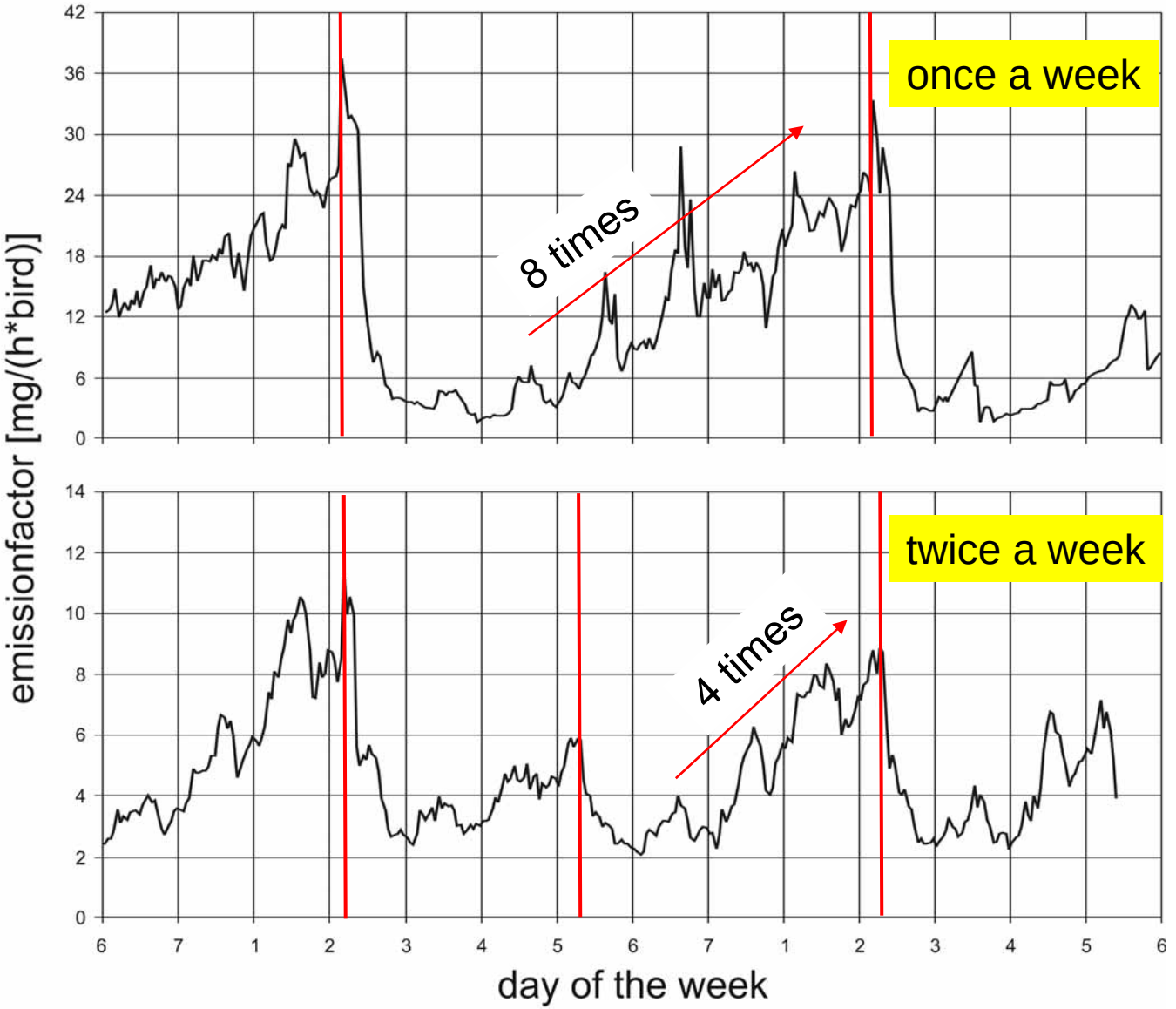
Dust during manure belt cleaning

48 hours´ course of ammonia concentration in the both systems



Ammonia emissions factors in two small group keepings

$$EF = \frac{c \times Q}{N}$$



Conclusion

Who is liable for dust and ammonia?

- both: bird and manager (farmer)

Who have more influence of better air quality in the barn?

- manager (farmer)

How can he do it?

- choose a “right” laying hens system
- choose the “right” manure management
- change some other factors (litter, light…)

Thanks for funding

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Thanks for Your Attention!

Leerfolie

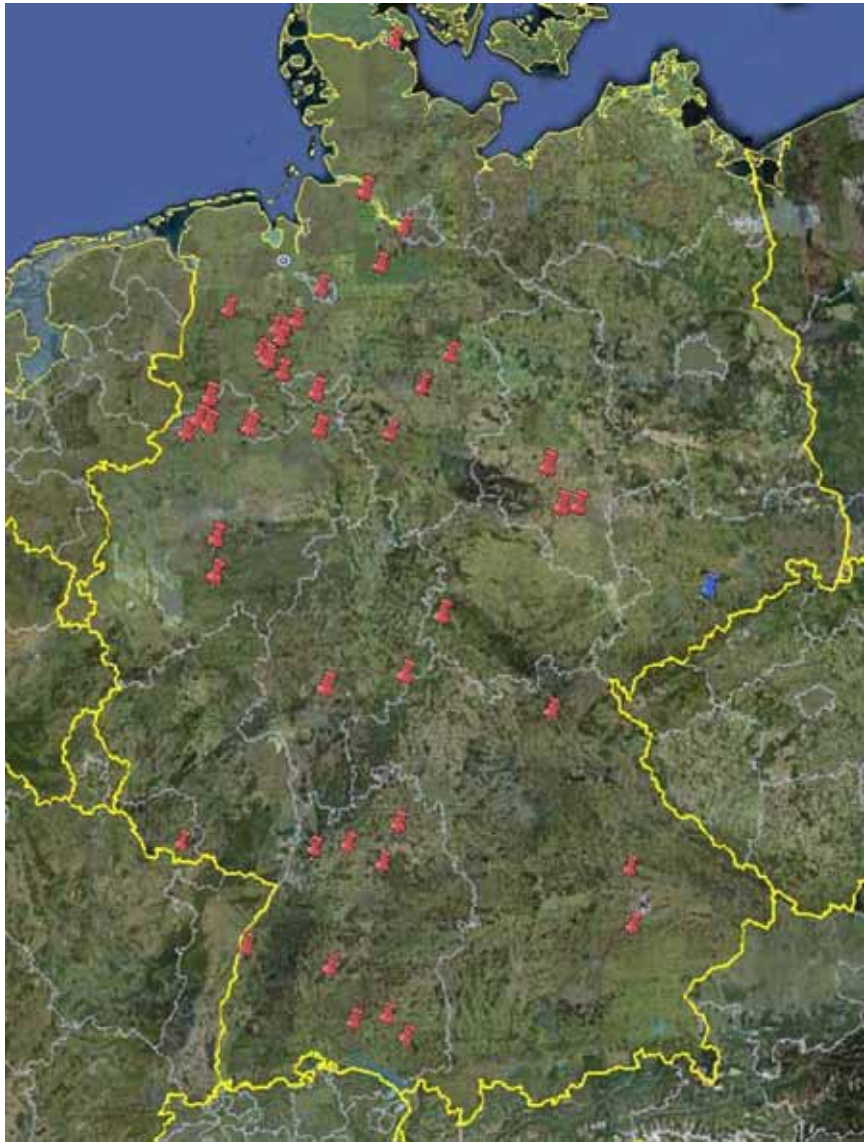
Leerfolie

Leerfolie

Leerfolie

Leerfolie

Where is it done?



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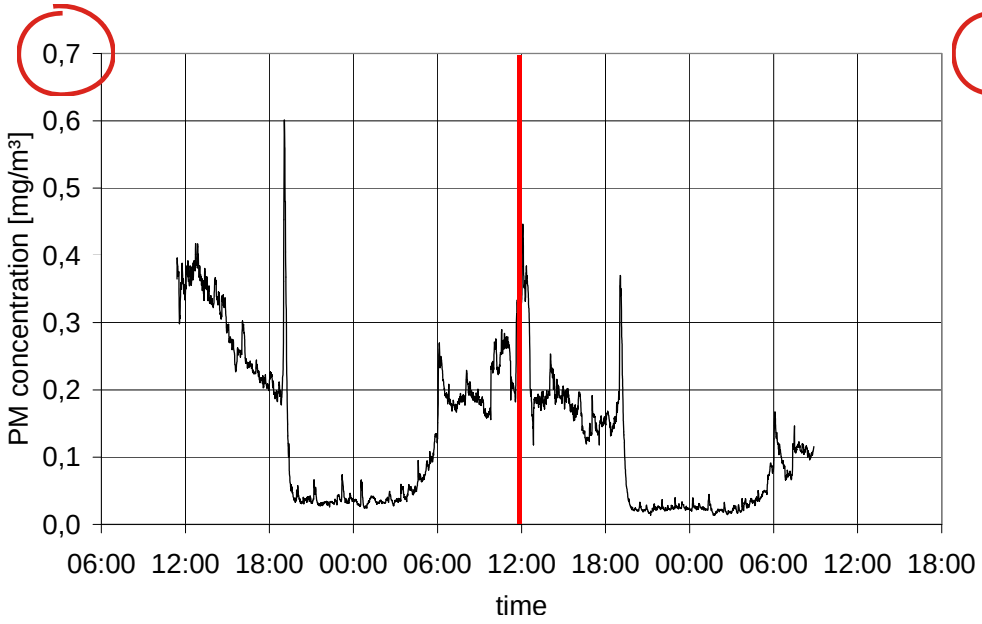
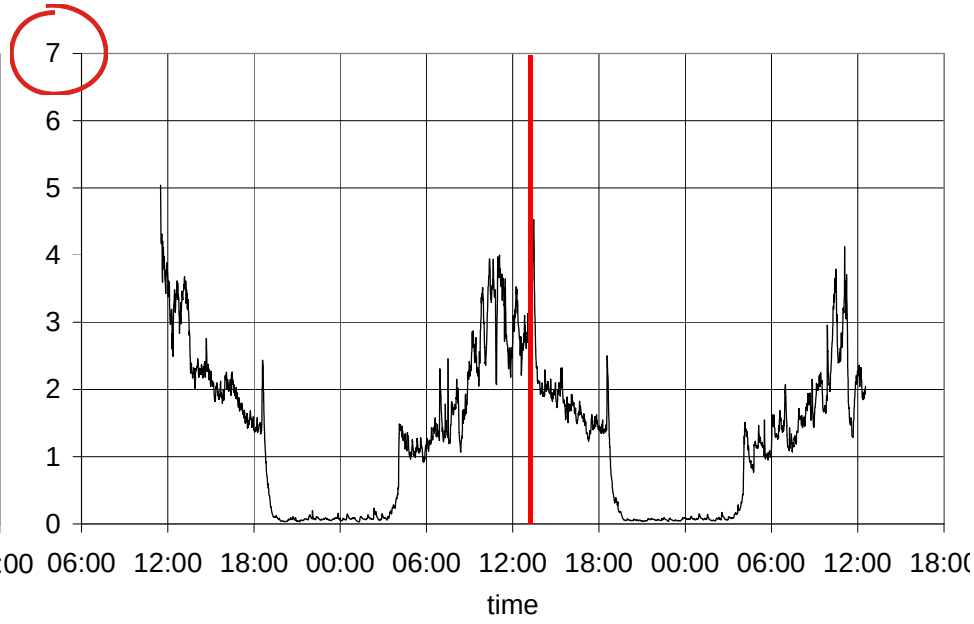


aviary



Factors influencing airquality in the barn

Keeping system

- **Litter: dust,** ammonia
- **Cleaning of manure belt: ammonia,** dust
- **Sand bath: dust**
- **Lighting program: dust**

- **Birds and their activity**
- **Farmers and their activity**