

EmiLi 2026 - Aarhus

A data-driven approach to new chemical odour emission factors

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Agenda

- SEGES & Environmental Technology
- Danish Odour Regulation and its history
- The challenge(s) we face today
- PTR-MS & the project → data-driven approach
- A new chemical odour emission factor...?

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Development of Danish agriculture

From co-ops to value-driven R&D and advisory services



500+ colleagues

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Department of Environmental Technology – who are we?



Emil
Jakobsen,
People Lead



Mads
Skærbæk,
Senior
Consultant



Michael Holm,
Senior
Specialist



Pia Brandt,
Senior
Consultant



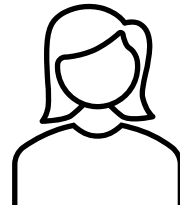
Stine
Grønborg,
Senior
Consultant



Torben
Jensen,
Senior
Scientist



Yijuan Xu,
Senior
Consultant



Pernille Lund
Kasper,
Senior
Specialist



Emissions

GHG · NH₃ · Odour



Technologies

Housing · Manure storage



H₂S & safety

Exposure · Risk reduction

MEASURE · DEVELOP · TEST · DOCUMENT

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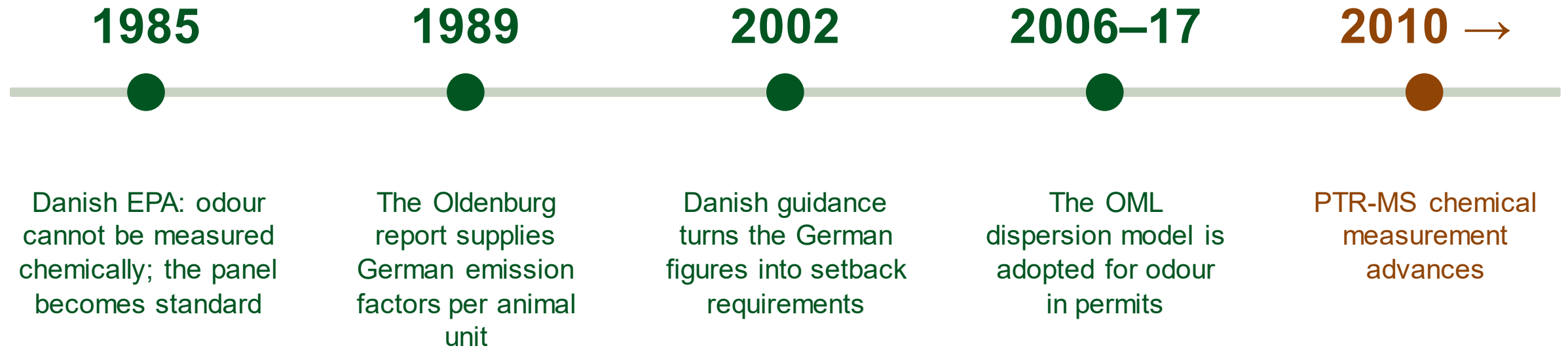
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Denmark's odour limits trace back to German panel measurements from the 1970s and 80s



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Source: Danish EPA guidance 1985; Oldenburg report 1989; Danish odour guidance 2002; OML for odour 2006–17

Systematic bias of olfactometry

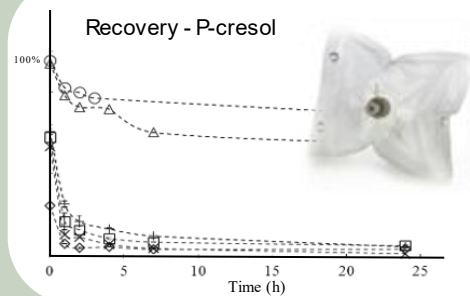
SOURCE

Mix of hundreds of VOC's



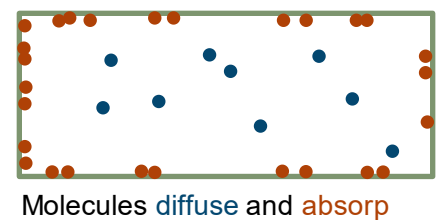
SAMPLE BAG

Key odorants from livestock production are lost rapidly



STORAGE

Compounds are lost depending on chemical characteristics and materials



OPERATION

Recovery depends on materials and pulse duration

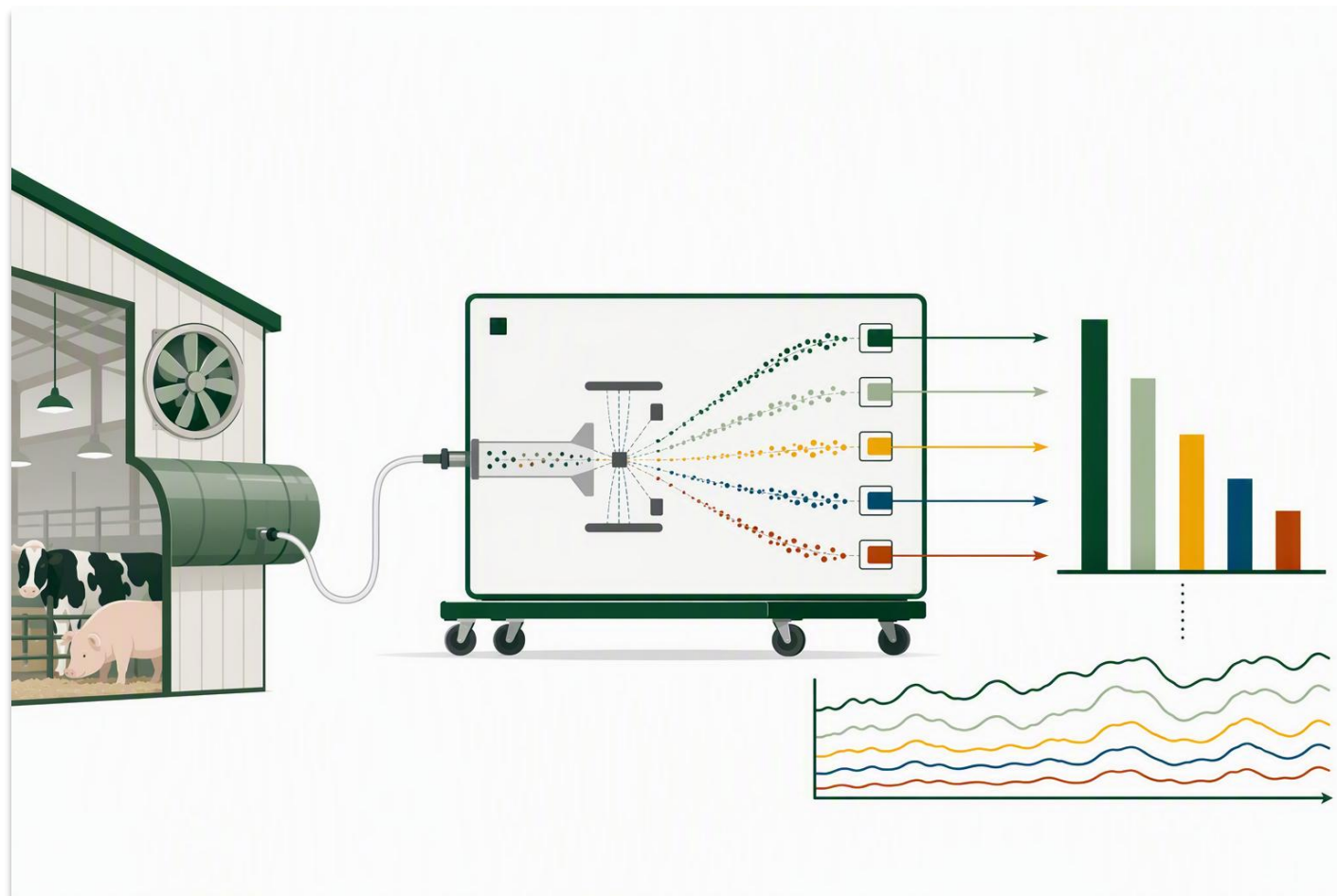


Source: Kasper et. al, 2018, Mechanisms of Loss of Agricultural Odorous Compounds in Sample Bags of Nalophan, Tedlar, and PTFE

Source: Hansen et. al, 2011, Stability of Volatile Reduced Sulphur Compounds in the Dilution System of an Olfactometer

Source: Hansen et. al, 2013, Recovery of Odorants from an Olfactometer Measured by Proton-Transfer-Reaction Mass Spectrometry

PTR-MS resolves the odour into individual compounds, in real time



Concentration pr. compound –
no bag, no panel

+200 signals pr. min. for each
sample

Since 2019: Allowed for
documentation of abatement
technologies (livestock)

Source: Hansen, MJ & Feilberg, A 2022, A protocol for chemical measurement of odor in relation to abatement technologies for animal production – Version 2

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Consolidating odour datasets collected across institutions

2010 →

the earliest measurements now being
consolidated into one dataset

50+

datasets with PTR-MS and/or
olfactometric data

The datasets differ — harmonisation comes first.

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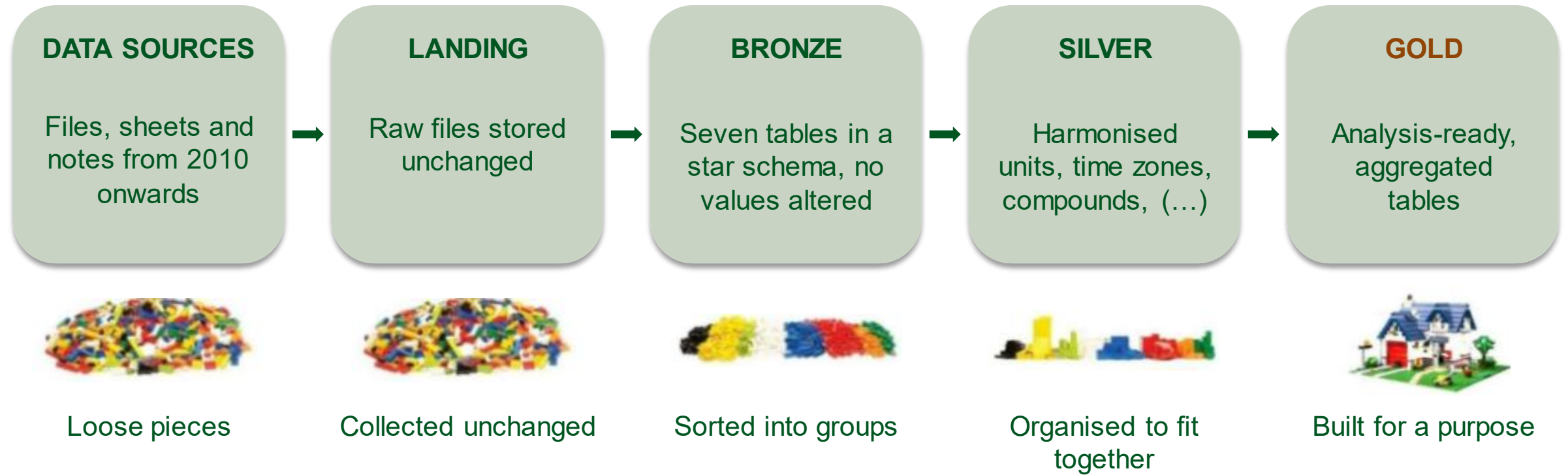
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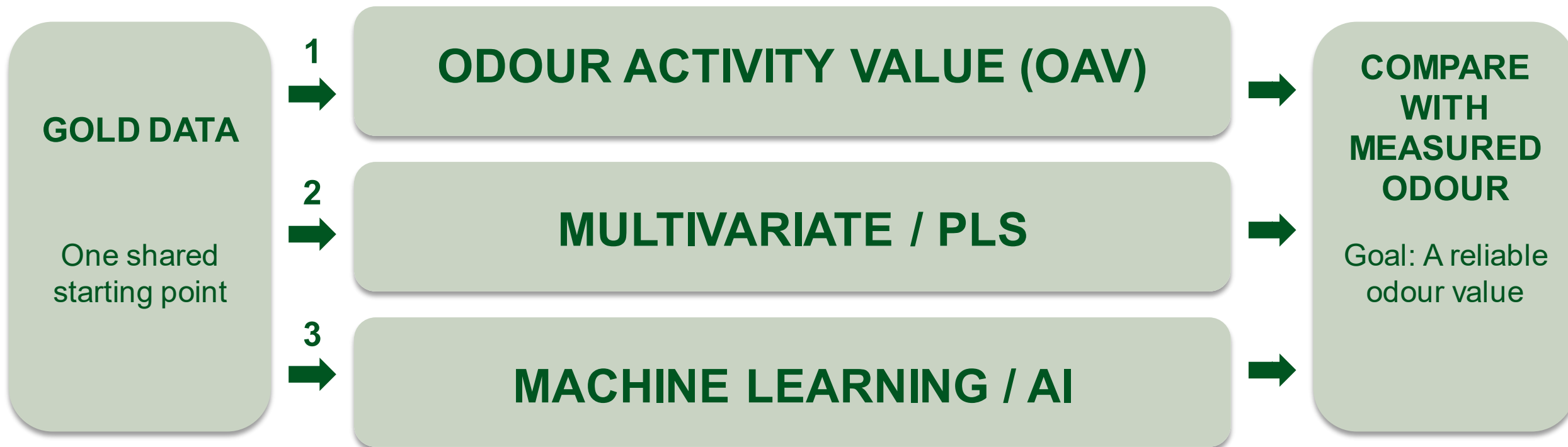
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A harmonised data-architecture



Three routes from chemistry to odour value

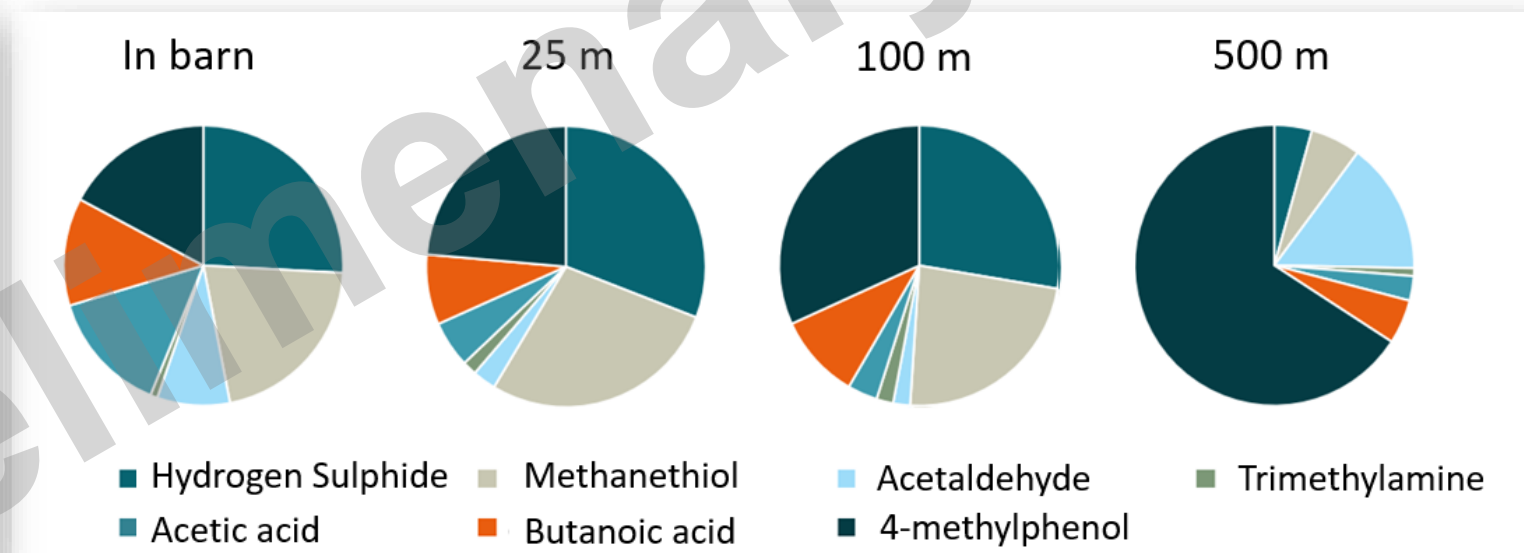
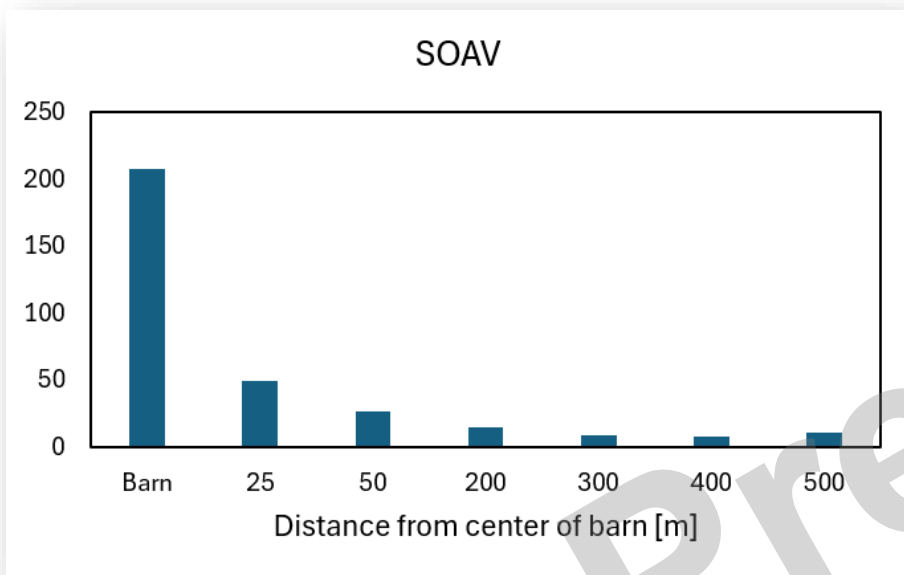


Source: Hansen et al. 2021, Additivity between Key Odorants in Pig House Air. Atmosphere 2021, 12, 1008

Source: Hansen et al. 2016, Multivariate prediction of odor from pig production, Atmospheric Environment 135

Perspective - Compound-level factors could change how dispersion to neighbours is modelled

This is the long-term gain — and still an open research hypothesis.



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Thank you for your attention!

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