



IPVSBb Studiedag
Beveren, 5th December 2025

SENSOR PP

Sensor based **EN**vironmental **S**urveillance and **O**bservation with
Realtime data in **P**ig and **P**oultry houses

Scope and applicability in pig farms

Joana Ceia





2021



Swine
Poultry



Product and Service
development (vet
practices, ...)



Contract
Research (CRO)

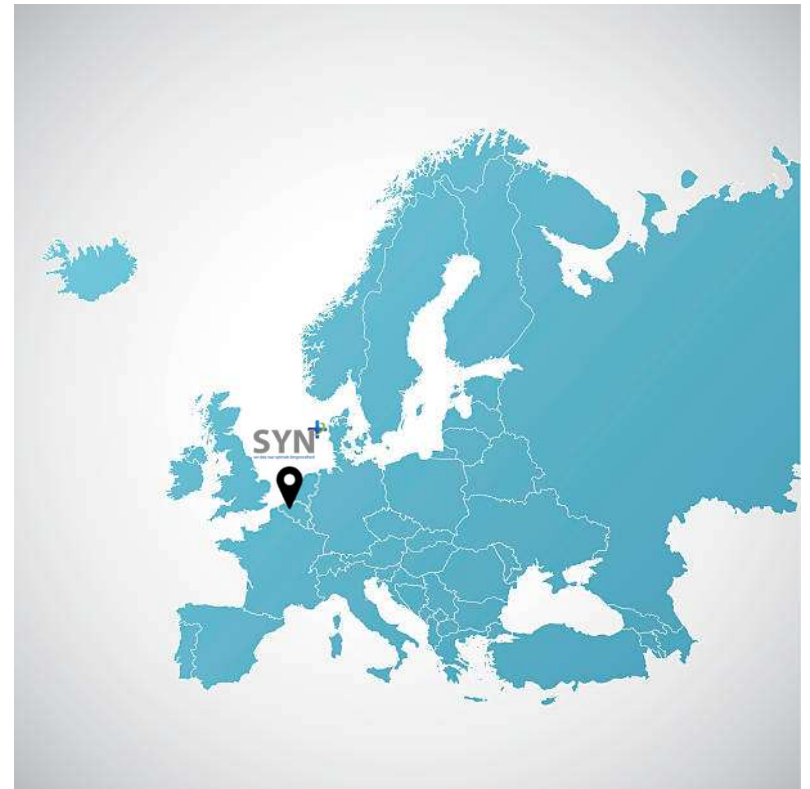
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Team:

- 3 Veterinarians
- 3 Health coaches
- 1 Data engineer



De Wallehoek | Field trials; registration trials



Despite significant technological advances in livestock housing, many farms continue to operate in **suboptimal environmental conditions**, contributing to **animal welfare issues** and **productivity losses**



Inadequate ventilation balance

Fluctuating gas (CO₂, NH₃) concentrations

Suboptimal temperature and humidity levels



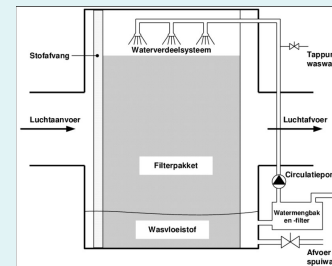
Restriction and \searrow of **AB usage**

\downarrow compensation for **health stressors**



Air washers / biofilters (biobeds)

Complexities in airflow patterns and system control

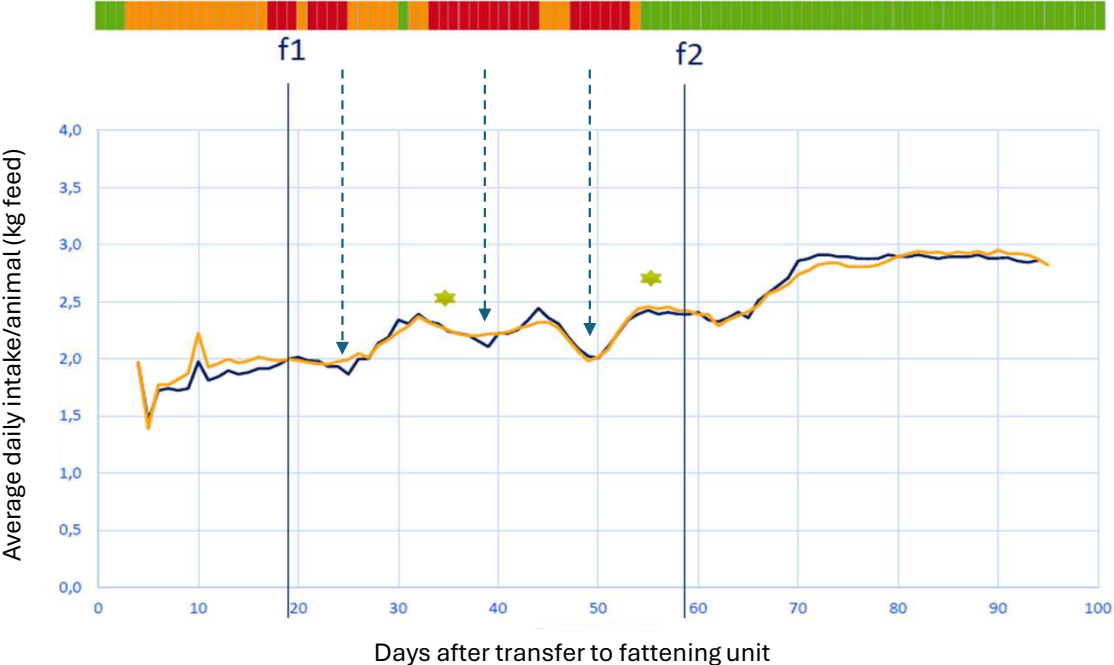


2010. H.H. Ellen,
N.W.M. Ogink,
M.C.J. Smits, I.
Vermeij
Aanmerking BBT
kleine sectoren
Rapport 369

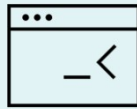


24/7 real-time respiratory health monitoring

Cough index and feed consumption



Despite significant technological advances in livestock housing, many farms continue to operate in **suboptimal environmental conditions**, contributing to **animal welfare issues** and **productivity losses**



Mechanical ventilation systems managed by automated computers, **but**

- remote real-time monitoring
- historical data storage
- contextual interpretation external weather conditions** (ex.: wind, rain)
- automatic reports/alarms**
- pressure differential ΔP**



Generic and static threshold / cut-off values

- housing design**
- ventilation type**
- class / age of the animals**
- correlation with productive data**



Real-time climate monitoring services

≠ traditional 1/2 day audit

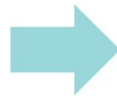


- temperature
- RH
- CO₂
- ΔP



- images
- NH₃
- real-time monitoring
- reports

sturdiness of the equipment



- temperature, RH
- CO₂, NH₃
- real-time monitoring
- images and videos
- partial computational vision



T°C, NH₃, CO₂, HR sensors

Wireless sensors
T°C, HR


COPEEKS
 Wi-Fi/4G connectivity
 HD 160° camera



- ΔP
- IR camera

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Partners European Consortium



Hungary



Germany



Belgium



Belgium

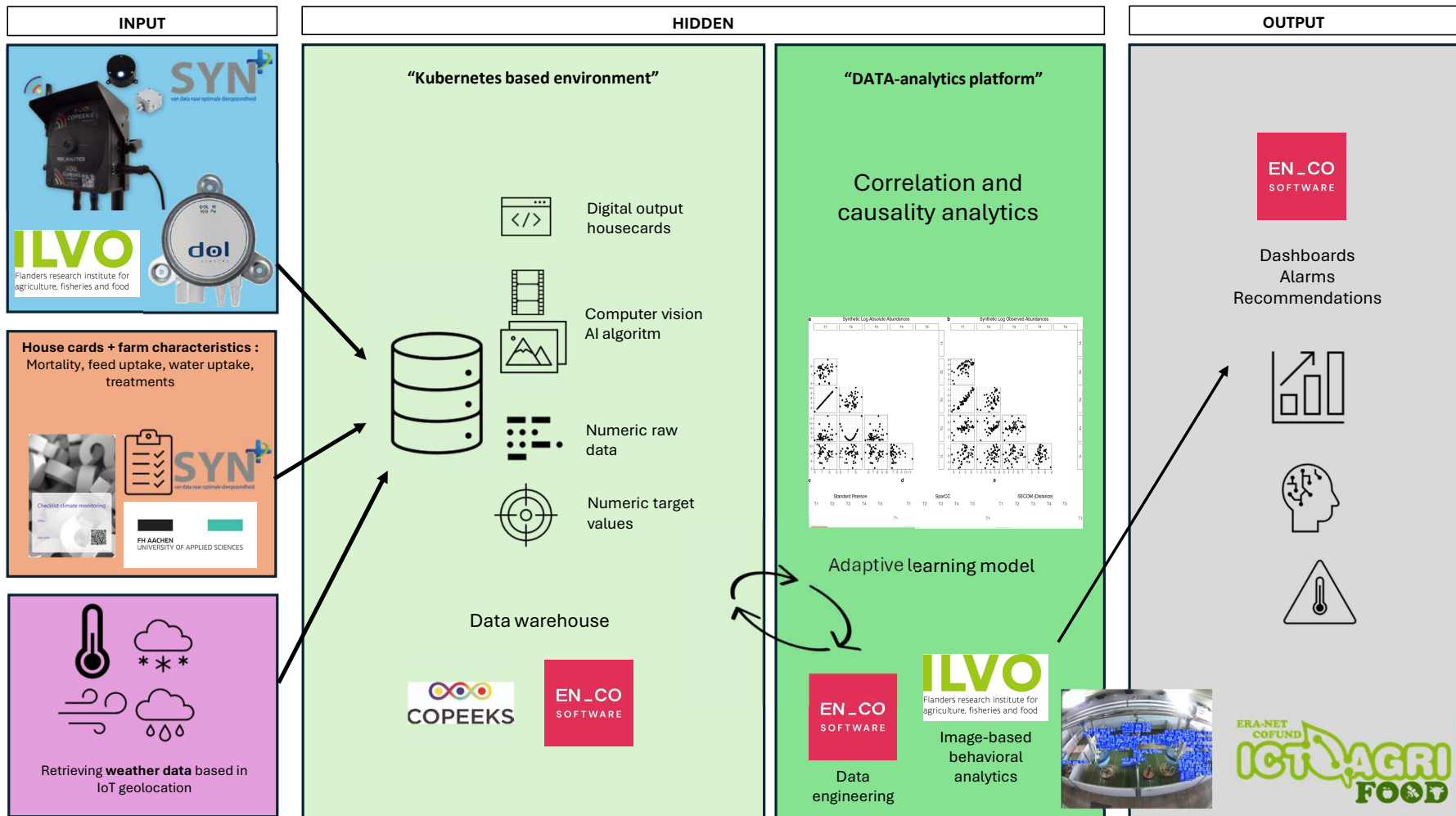


France



Co-funded by
the European Union

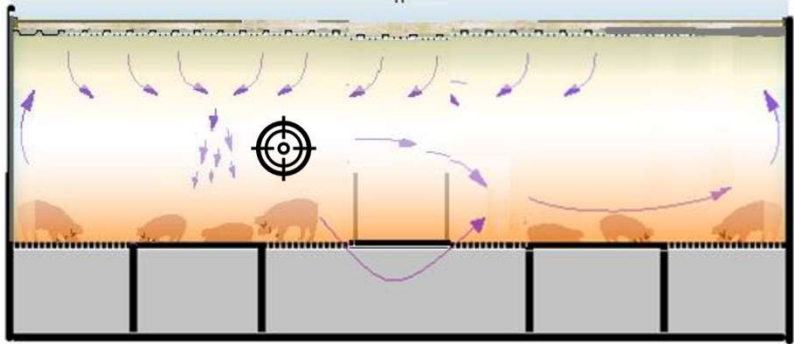
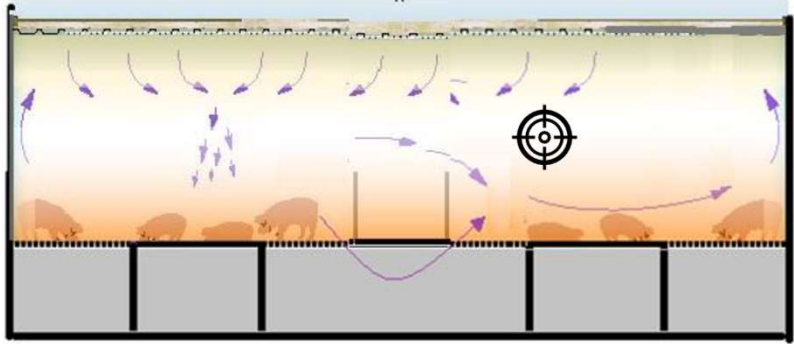






Real-time climate monitoring - practical cases

Case 1: Ear tip necrosis in the nursery



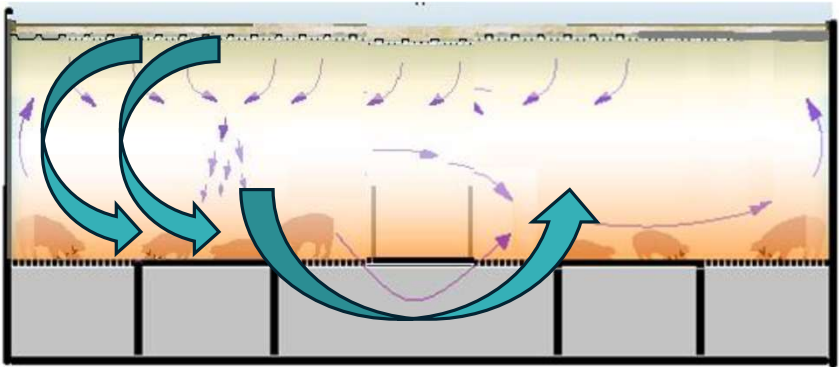


Real-time climate monitoring - practical cases

Case 1: Ear tip necrosis in the nursery



Pigs lying on the corners of the pens



Too many openings on the ceiling on the left side of the compartment



air descending too quickly



and since pit ventilation was occurring



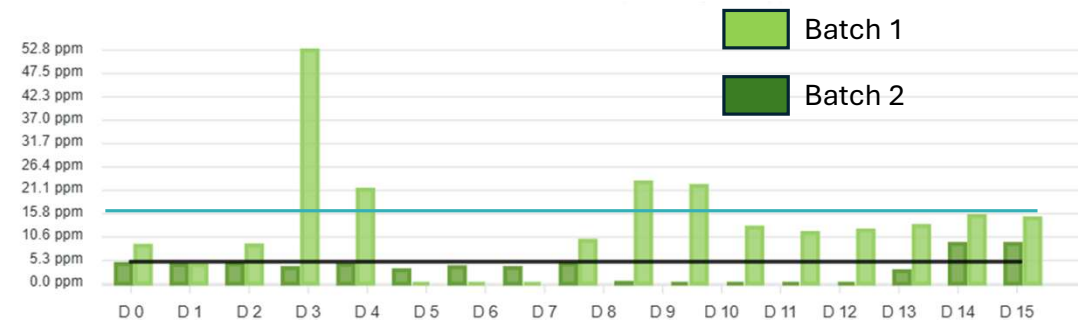
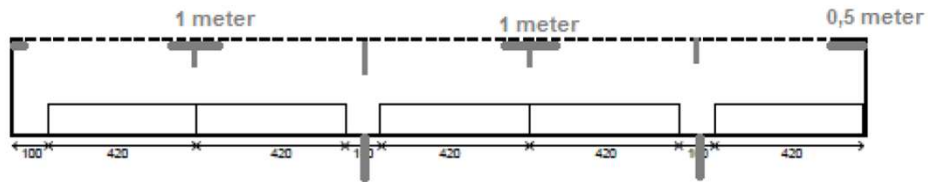
Air (with high NH3 concentrations) was coming out on the right side of the compartment

Ceiling on the right side with less openings (2 m from the wall) → less air supply and renewal



Real-time climate monitoring - practical cases

Case 1: Ear tip necrosis in the nursery



① Rubber mats placed on the center of each pen

- ② Gaps between walls and ceiling covered
- ③ Rubber flaps of 30-40 cm added above each path and pen division
- ④ Reduction of the overall perforated surface: cover 1 m around each ventilator and going from a total of 336 m² to 250 m²
- ⑤ Making doors air tight



Real-time climate monitoring - practical cases

Case 2: Uneven growth, cough and episodes of APP in the nursery

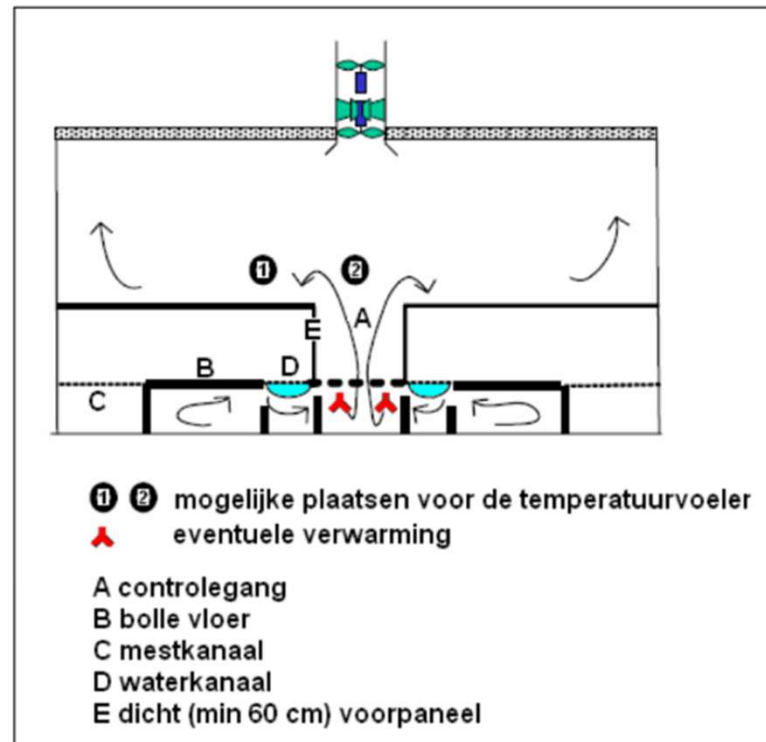
- Compartments: 8 pens with 29 animals each
- Heating environment: 3 delta tubes
- Curved, heated concrete floor in the middle
- Remaining sections → slatted flooring
- 2 ventilators of 46 cm diameter each
- No measurement impeller
- Manual adjustments throttle unit





Real-time climate monitoring - practical cases

Case 2: Uneven growth, cough and episodes of APP in the nursery

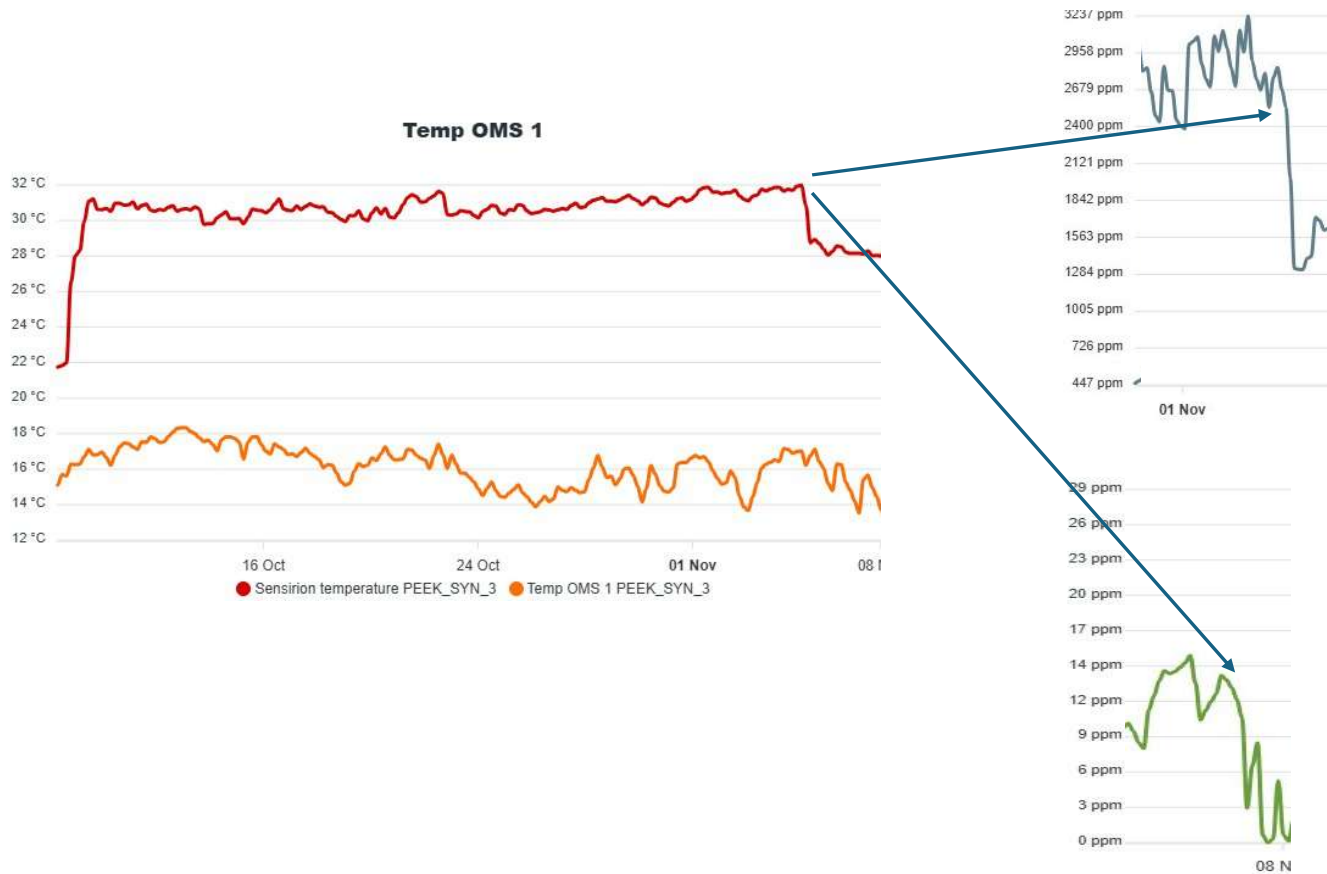


Figuur 2 Doorsnede kanaalventilatie via controlegang (bron: Klimaatplatform varkenshouderij)



Real-time climate monitoring - practical cases

Case 2: Uneven growth, cough and episodes of APP in the nursery



Elevated temperature



turning of floor heating

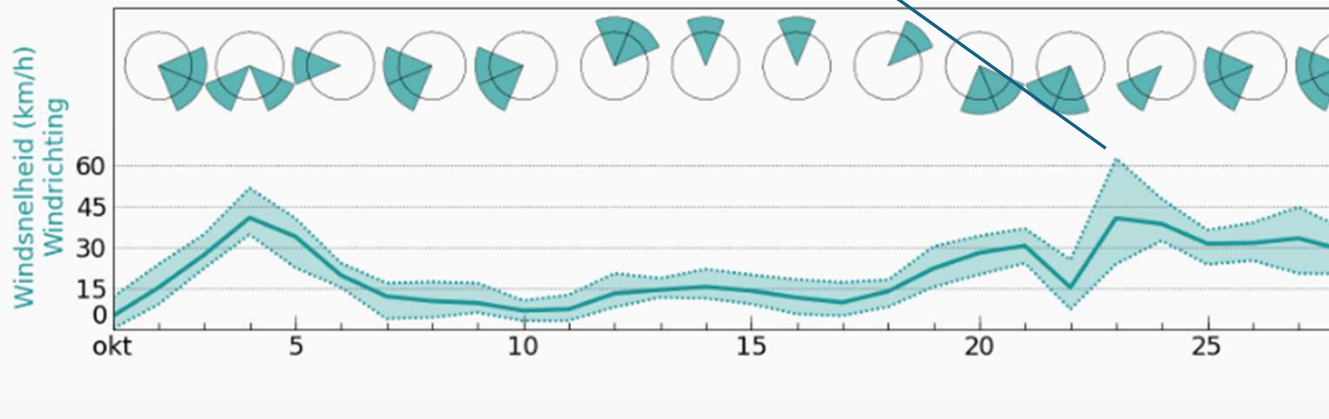
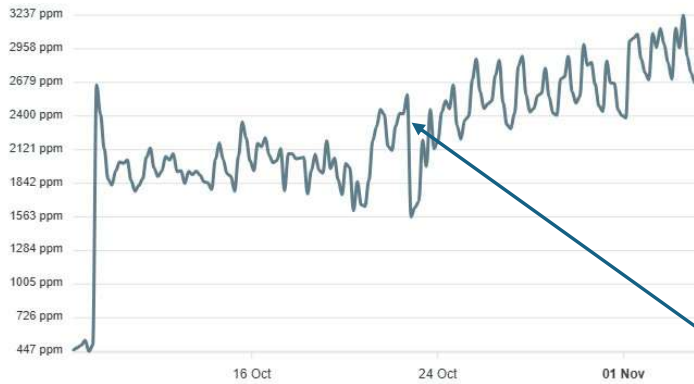
Correct defecation behavior key for control of NH₃ (and CO₂?)



Real-time climate monitoring - practical cases

Case 2: Uneven growth, cough and episodes of APP in the nursery

Sensirion co2 rate PEEK_SYN_3



**Wind influences on
CO₂ level/ventilation
levels**



Real-time climate monitoring - practical cases

Case 2: Uneven growth, cough and episodes of APP in the nursery

Fumigation tests

- ❶ Too little of entering air at the beginning of the compartment in young animals
- ❷ Too much air speed at the end of the compartment in older animals
- ❸ Leakage of cold air from doors being too small



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