Health monitoring of livestock with sound

NVTL conference

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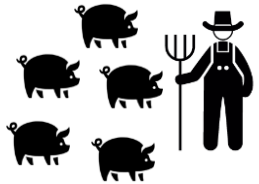
Challenges for livestock producers

Time is limited
Available time per employee remains the same, so less time per animal



Infection pressure
Intensive livestock farming increases infection pressure

Growing livestock facilities
To cope with the rising global food demand, livestock houses are growing, housing more animals

Antibiotics resistance
Growing resistance worldwide due to intensive use

Environmental impact
Limit the environmental load with increased production

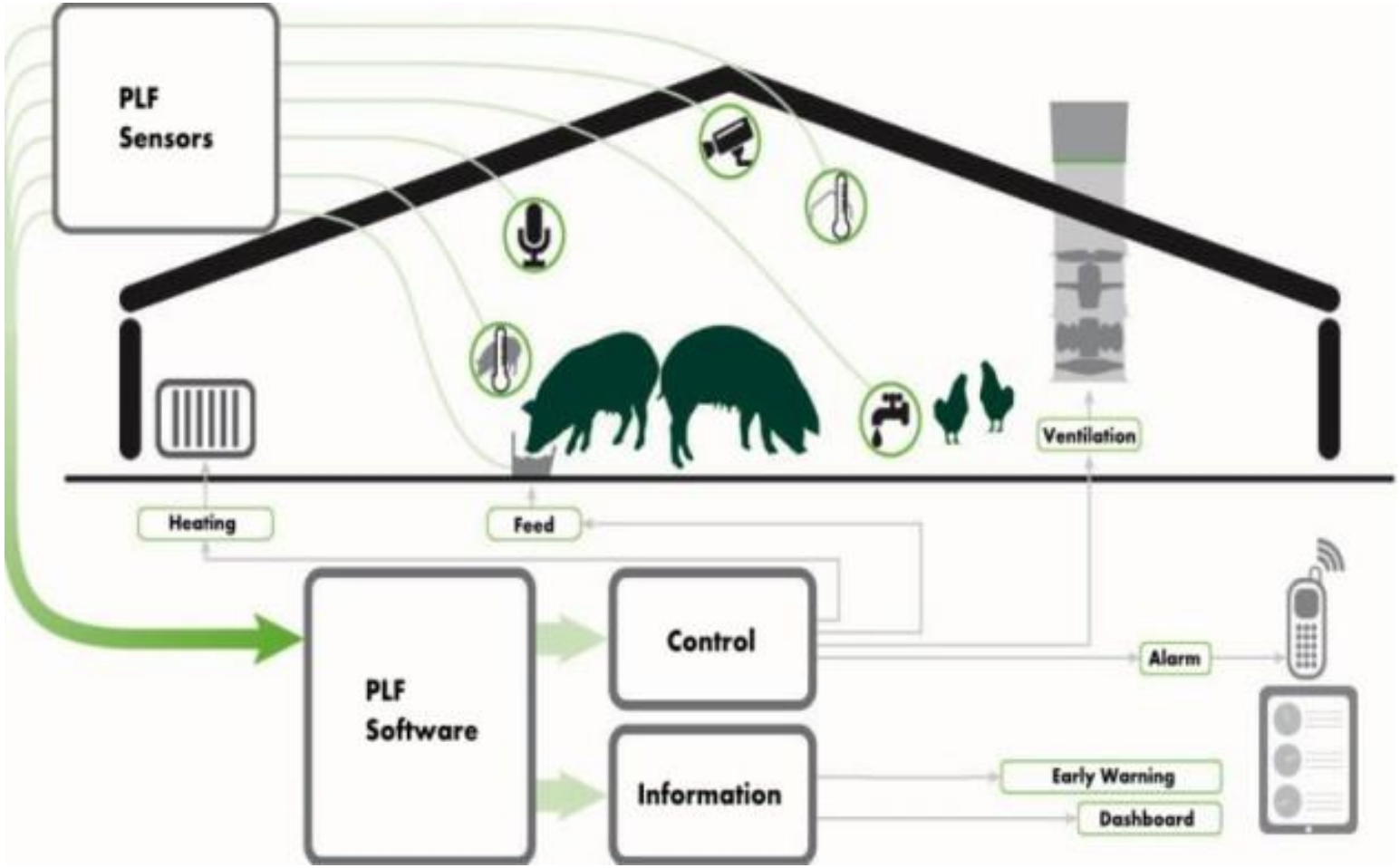
Animal Welfare
Maintain high welfare despite more intensive farming

Livestock farming in the past

Livestock farming today

Precision Livestock Farming (PLF)

Management of livestock farming by continuous automated real-time monitoring/managing of production/reproduction, health and welfare of livestock and environmental impact.

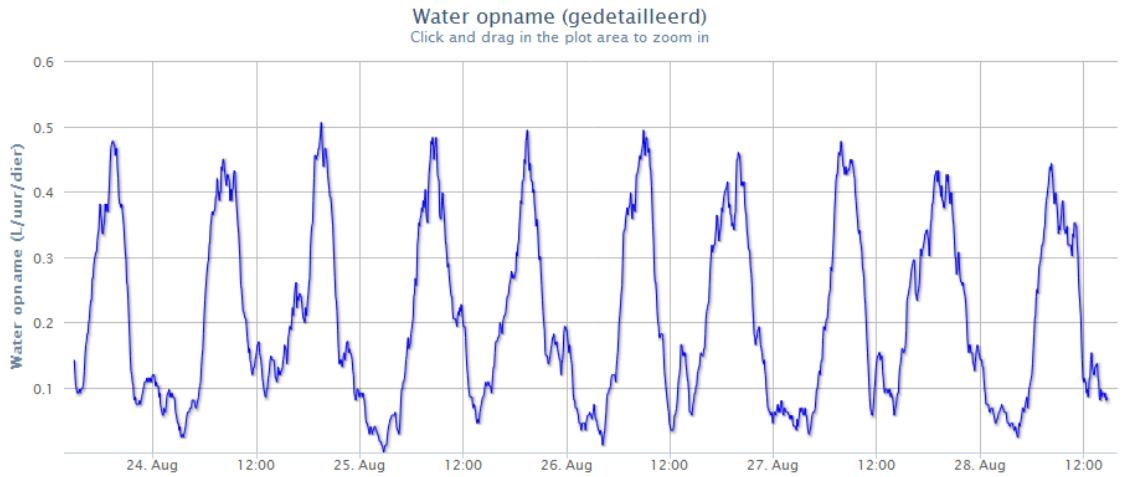


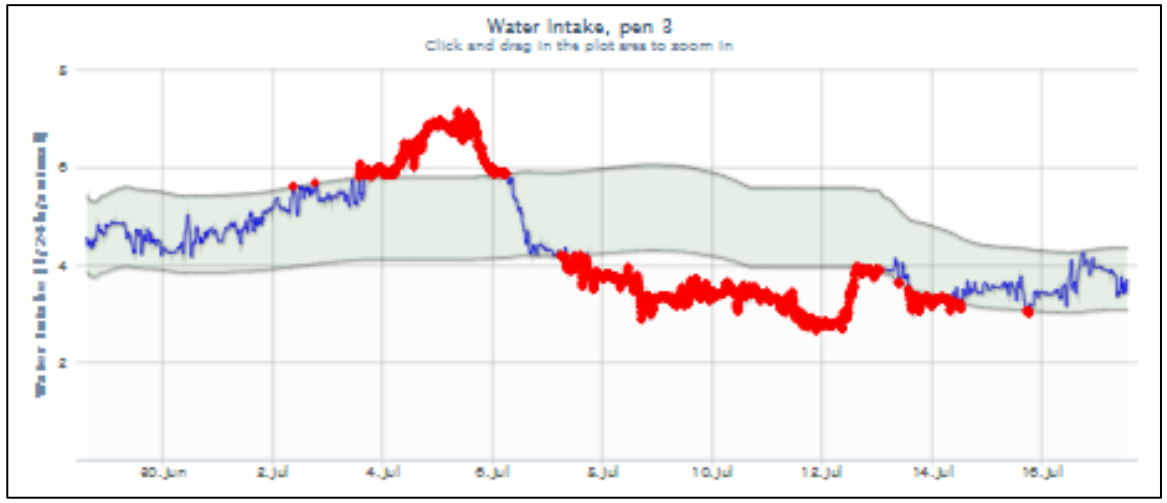
PLF examples for pigs

Water monitoring

Deviations from the normal drinking pattern

could indicate distress

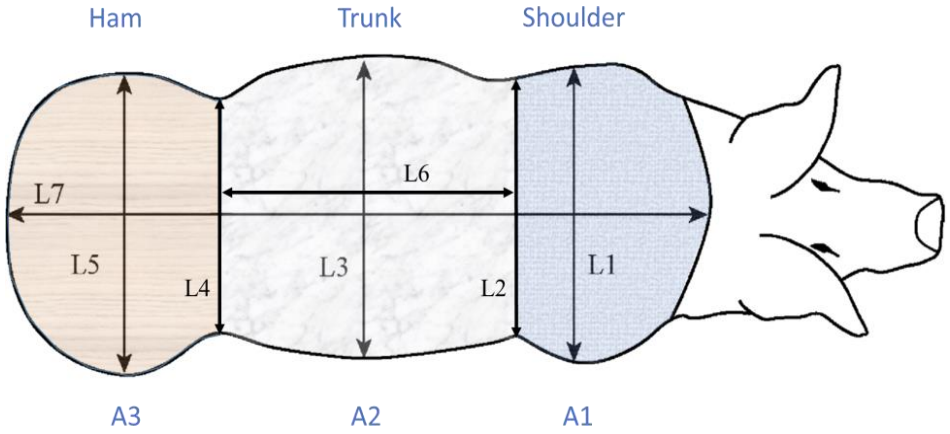


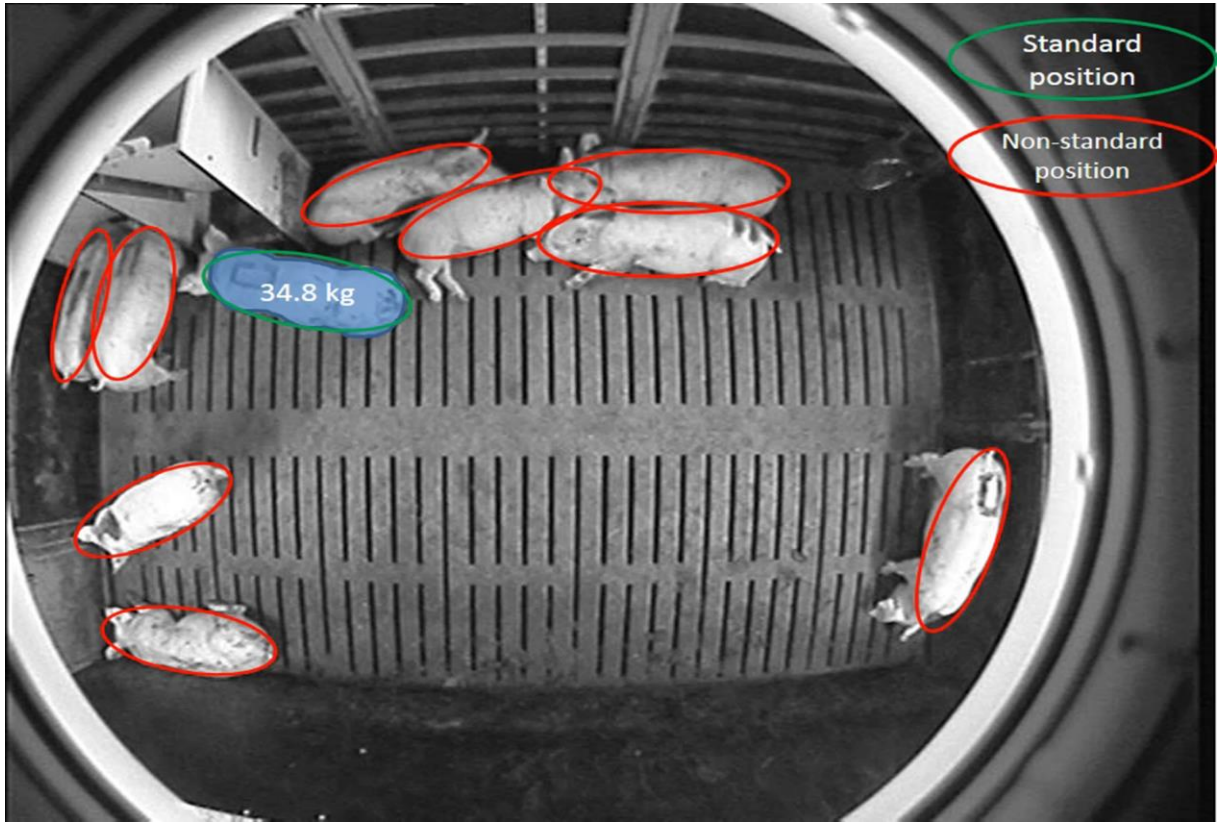


PLF examples for pigs

Weight estimation with camera

Live and real time weight estimation of group of pigs

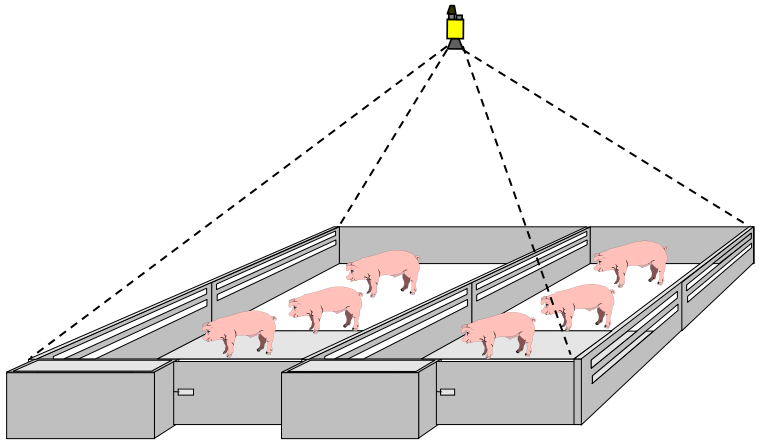


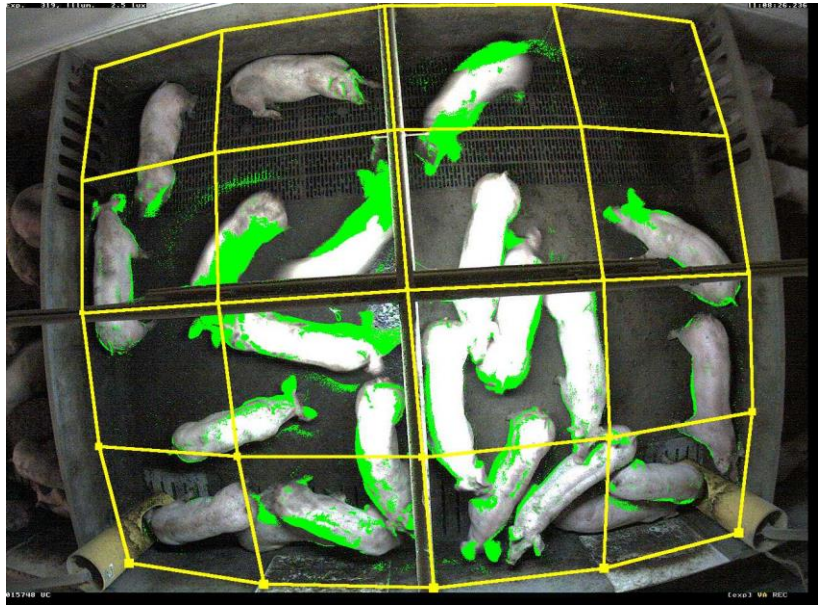


PLF examples for pigs

Position and activity tracking with camera (eYeNamic)

Automatic monitoring of pig position and activity to indicate illness, aggressiveness,…





Activity			
1	5	48	6
21	51	26	22
26	31	13	10
2	30	21	9

Health monitoring of pigs with sound

Why sound ?

- ✓ **Sound** is a very rich signal, which allows the development of **many applications with a single sensor**
- ✓ Examples:
  - ✓ coughs and sneezes as health indicator (pigs)
  - ✓ stress vocalizations as welfare indicator (poultry)
  - ✓ Screams and squeals as aggression indicator
  - ✓ background noise as machinery status indicator
  - ✓ ….

- ✓ Microphones can be used **in the dark**, can measure around corners and are **able to withstand the harsh conditions** in livestock houses

SoundTalks NV

Founded November 2011

Young, dynamic and passionate company

Top 10 most innovative startups in Belgium

5 patent applications

In collaboration with Boehringer Ingelheim

Spin-off KULeuven & UNIMI

KU Leuven, faculty of engineering (PMA)

KU Leuven, faculty of bio-engineering (M3BIORES)

UNIMI, dept. health, animal science and food safety (VESPA)

Vision

To give every animal a life worth living

Short-term

Focus initially on technologies for monitoring **livestock health** with **sound**.

Respiratory health monitor for fattening pigs

Scientific background

- Research started at **KULeuven** from 1996 – 2011
  5 PhDs on pig cough
  > 30 journal publications

Importance of respiratory health issues in pigs

Negative impact on:

- ➤ Survival rate
- ➤ Average daily weight gain
- ➤ Feed conversion rate
- ➤ Homogeneity
- ➤ …

Cost of respiratory diseases can be more than **10€ /pig**.

Challenges

- Complex, multifactorial, dynamic nature of **respiratory diseases** in pigs
- Time and money consuming **farm management**
- Lack of **experienced/well trained personnel** to work in farms
- Lack of objectivity when **evaluating clinical signs**
- Increased pressure on **responsible antibiotic usage**

Our solution for pigs

Continuous objective monitoring of respiratory health status in fattening pigs by automated analysis of pig sounds !

Protects herds and profits
Early detection of potential respiratory diseases

Increased efficiency
Better **planning** and **prioritization** of your daily routine

Peace of mind
Remote monitoring and **objective** health status assessment 24/7

Improved communication
Personalized communication and secure data sharing

SoundTalks Monitor

Gateway

Monitor

MONITOR

- ✓ Each monitor (covering a specific zone) **contains multiple sensors** generating respiratory heath status at a zone level
- ✓ **Design is small and elegant**
- ✓ **Permanent** device for in the barn
- ✓ **Gateway** installed on the site for internet connection
- ✓ **WiFi** communication between devices and gateway
- ✓ Multiple devices visual in **app**

3 patent applications

How does it work?

Hardware

Objective measurement of a herd of pigs

Algorithms sound and climate

Automated analysis of pig sounds and climate information

Cloud-based solution

Excellent service in scalable model

Remote monitoring

IP protection

Customer intimacy

Useful Information

- of specific farms
- for specific users

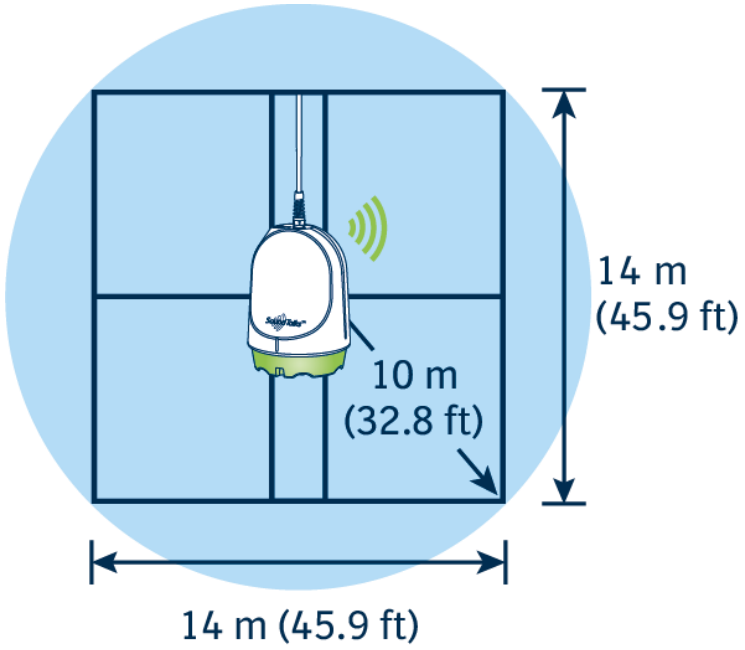
Coverage

Area
+/- 20 m diameter

 # Animals
+/- 250 animals

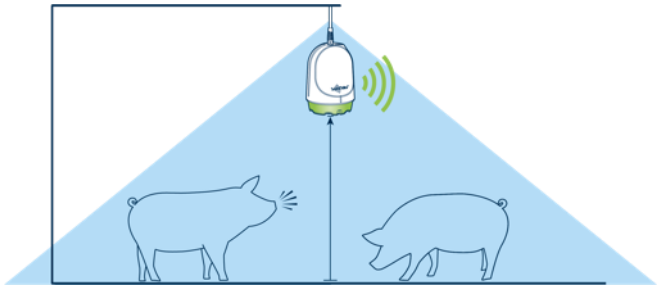
AREA

20 m (65.6 ft) diameter
per monitor

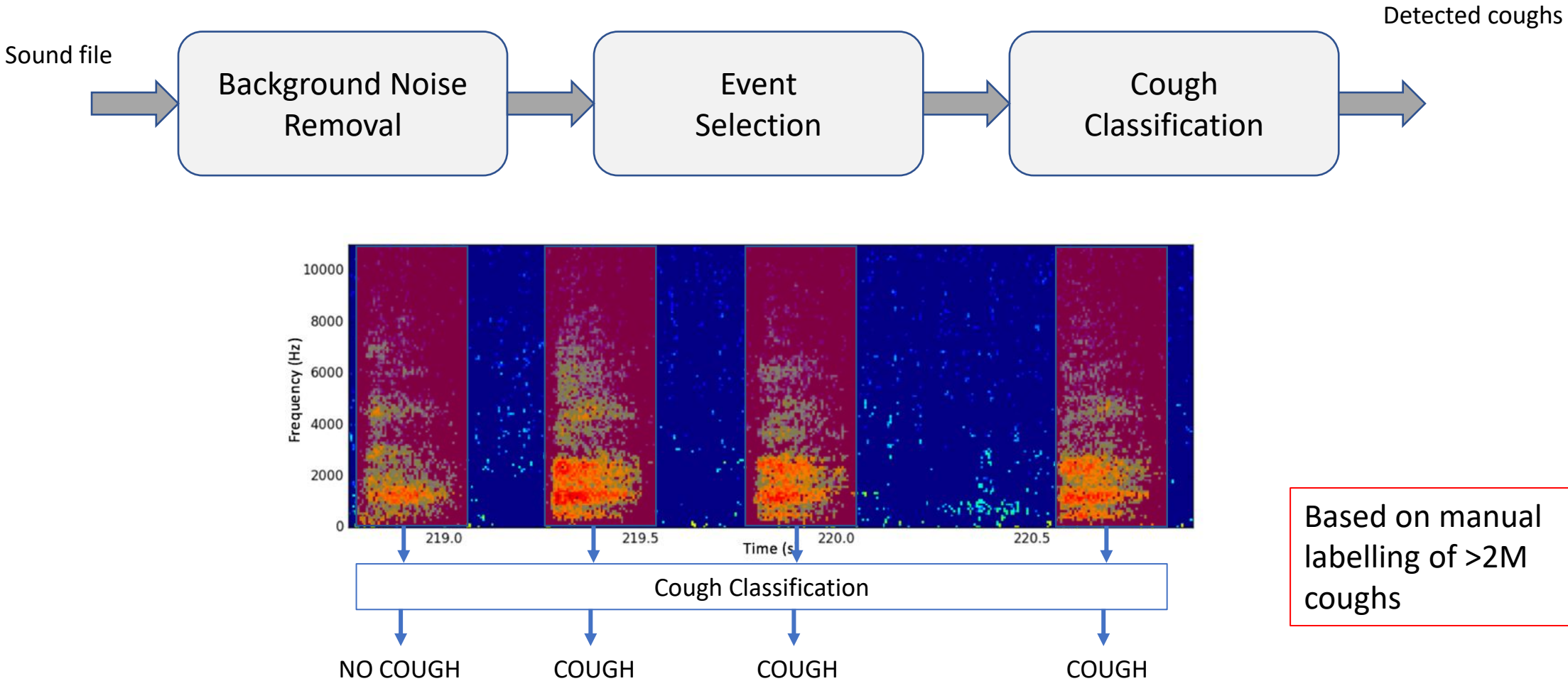


HEIGHT

Microphone at a minimum
of 2 m (6.6 ft) high

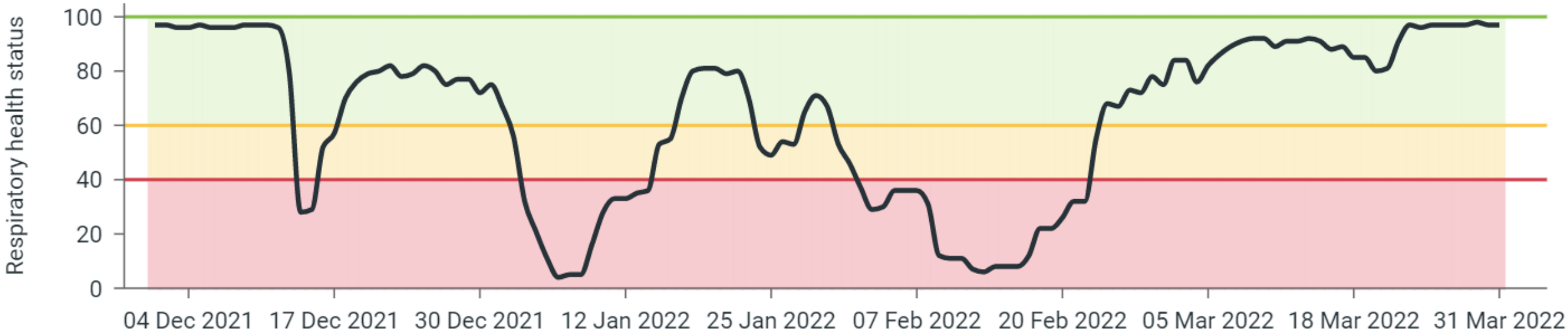


Cough Detection Algorithm (pigs)



Based on manual labelling of >2M coughs

Respiratory health status (fatteners)



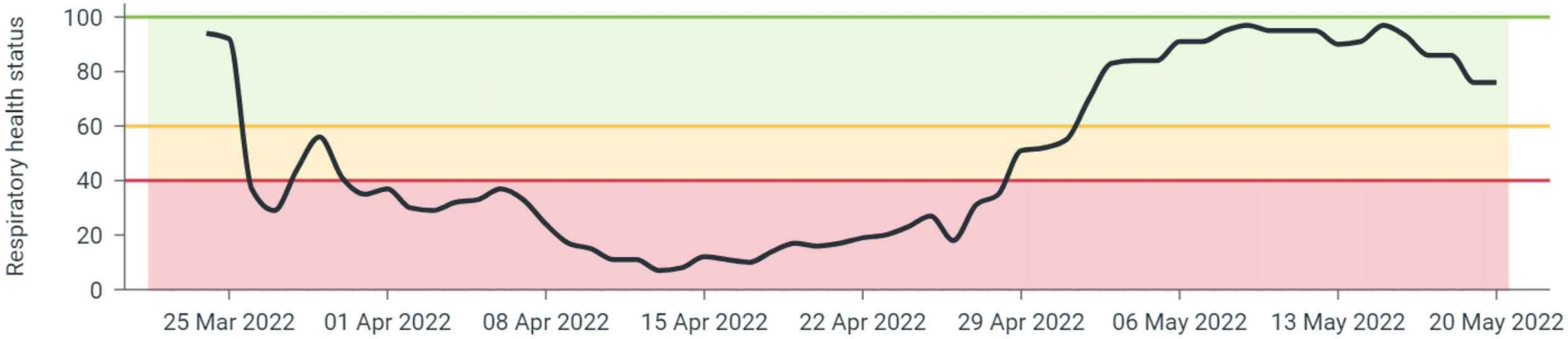
Action recommendation (example)

Episode day 2

RECOMMENDATIONS

- Check environment in the zone(s) with an alarm: temperature, relative humidity, and behavior of the animals
- Consult with your veterinarian.
- Observe and identify sick pigs individually and according to the ReHS value, an anti-inflammatory / antipyretic treatment for the group may be indicated in accordance with veterinary advice.
- Ensure preparedness for diagnostics sampling and treatment therapy.

Respiratory health status (piglets)



Monitoring pack

Monitor

24/7 sound and climate measurement

Web app

Live display of results and data from all the sites that you manage

Gateway

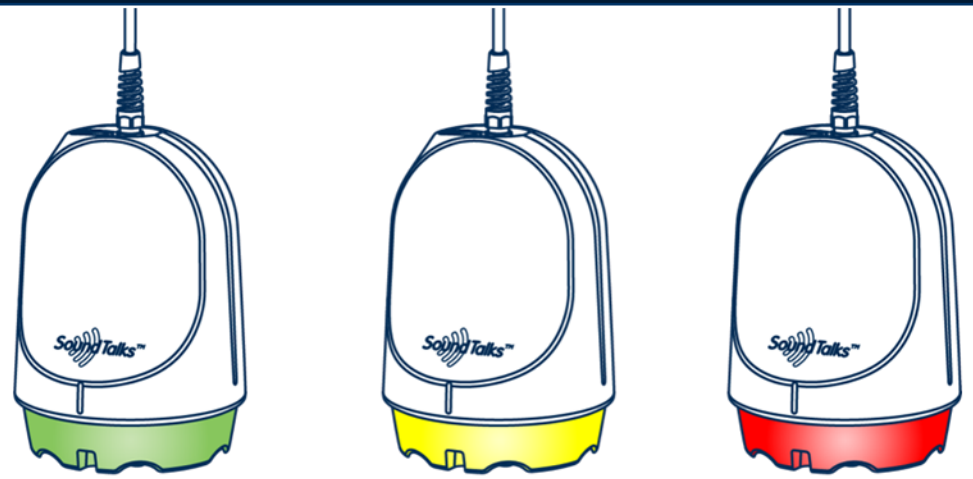
Collects data and sends the data to the cloud

Mobile app

Fast overview for on the road

SoundTalks monitor in the field

Relates to barn status



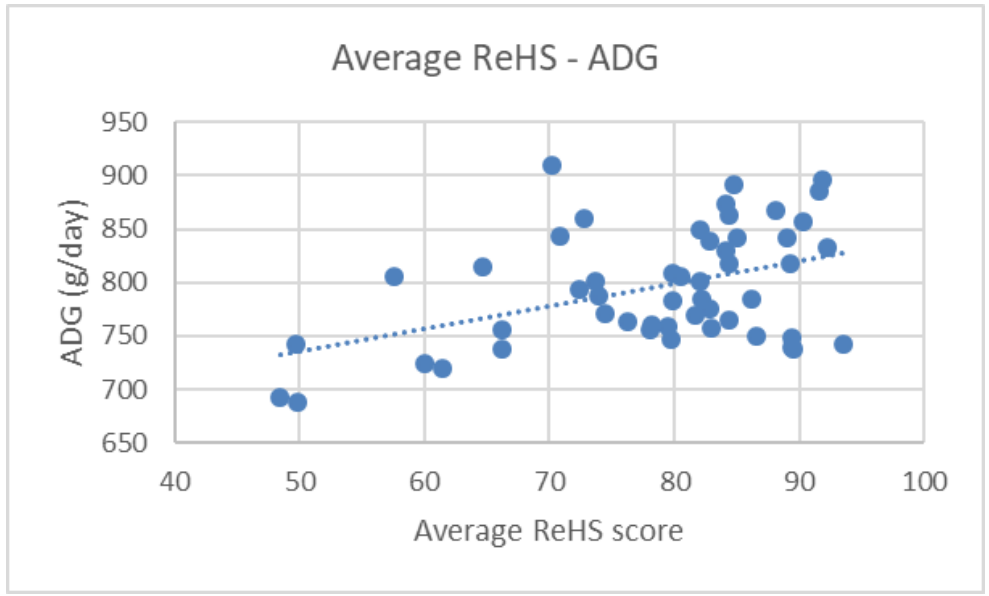
Green
Respiratory health status is ok.

Yellow
Caution!
Potential respiratory health problems. Vigilance required.

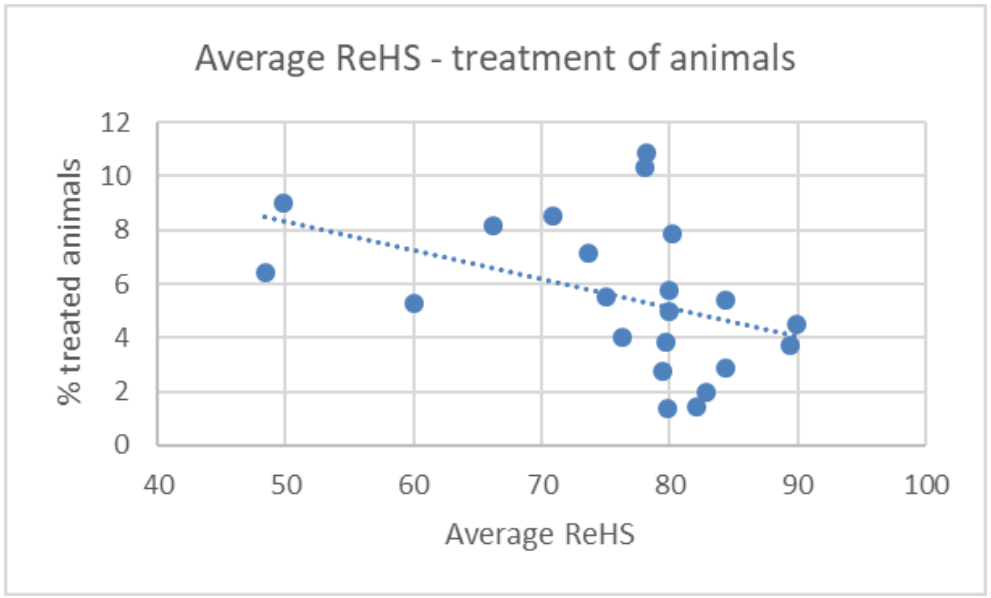
Red
Risk! High level of coughing. Action required.

SoundTalks monitor in the field

Relation between Respiratory Health Status (ReHS) and performance and % treated pigs (fatteners)

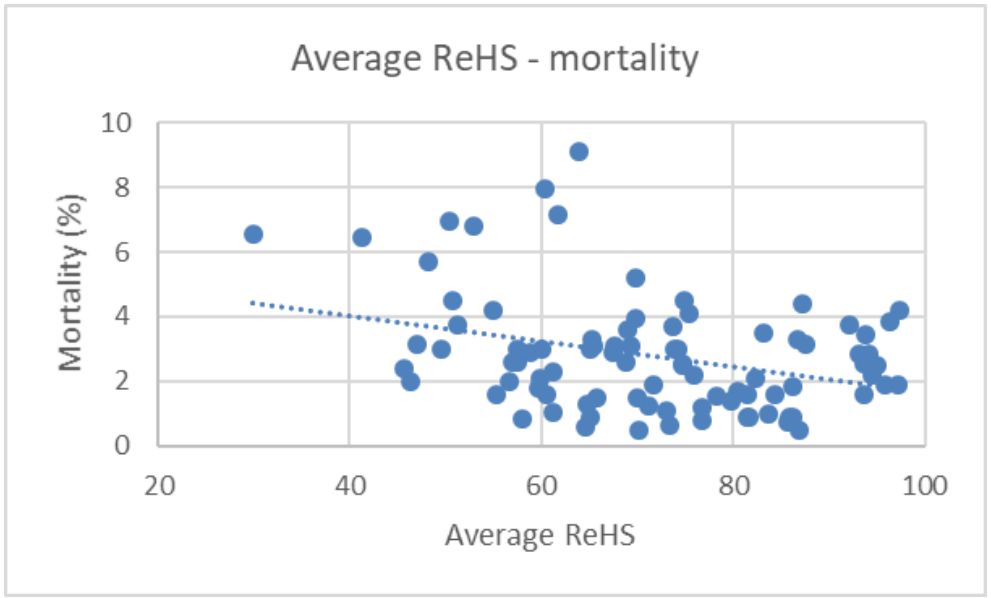


Average Daily Gain

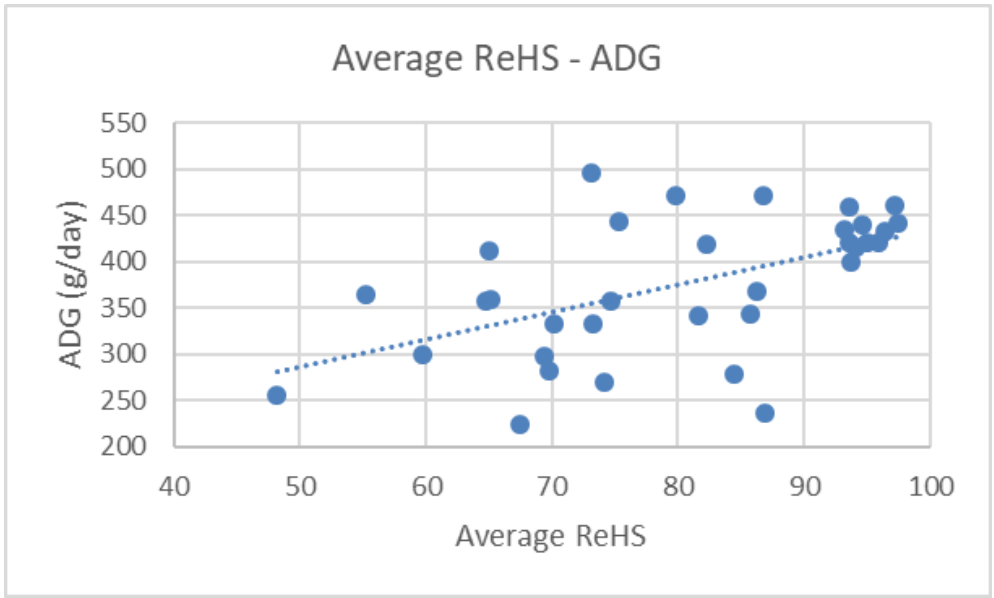


Percentage treated animals

Relation between Respiratory Health Status (ReHS) and performance (piglets)



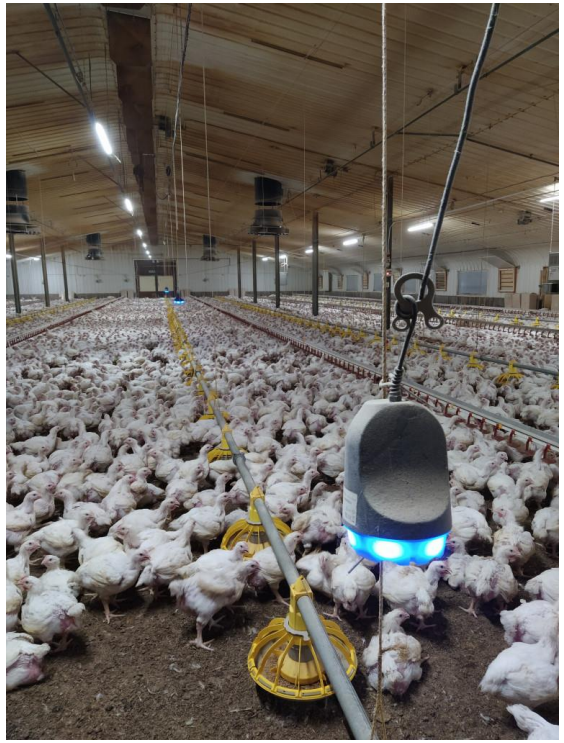
Mortality



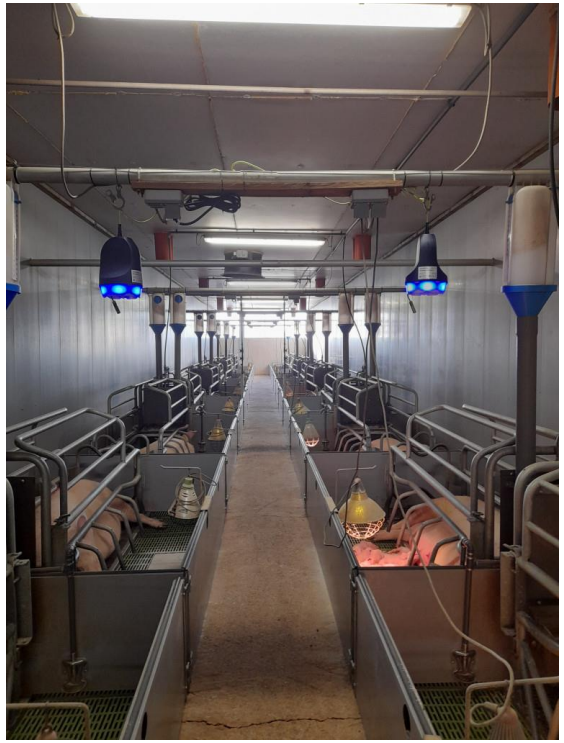
Average Daily Gain

Other applications under study

product for **health** and **welfare** monitoring for **poultry** and **sows**



Stress vocalizations



Piglet screams

Aggression
Health status sows

Questions ?