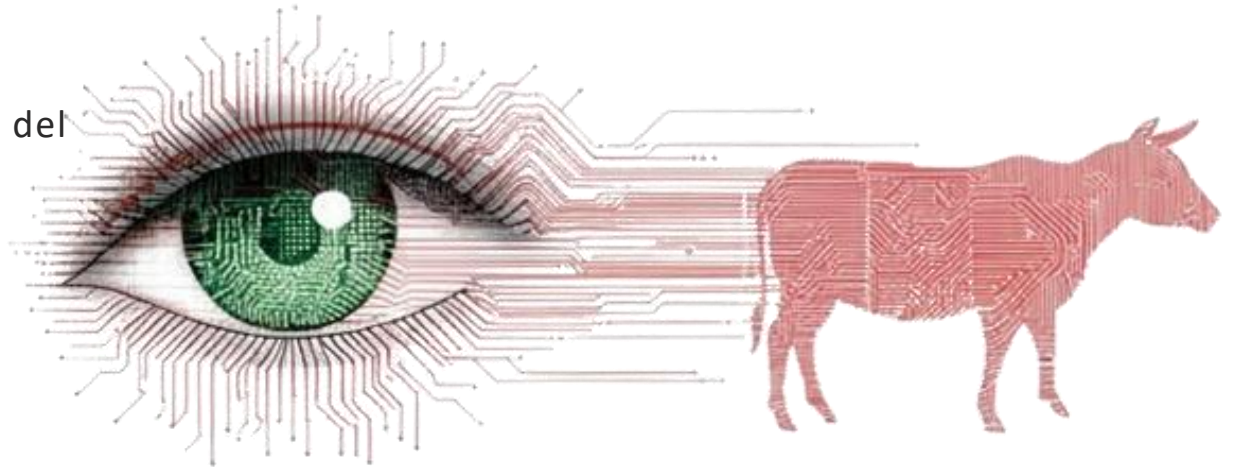


MÁS ALLÁ DEL OJO HUMANO: INTELIGENCIA ARTIFICIAL EN MATADEROS

Fecha: 05 de junio de 2026

Lugar: Sala Ernest Lluch, Ministerio de Sanidad, Paseo del Prado, 18-20, 28014 - Madrid.



Nombre ponente



Remote meat control –

Can technology take us closer?

Swedish Food Agency

Meat inspection today



The challenges today

- Small-scale abattoirs and game-handling establishments, often located on remote areas in Sweden.
- Scarse veterinary resources
- Logistic hurdles
- Uncertain situation in the world



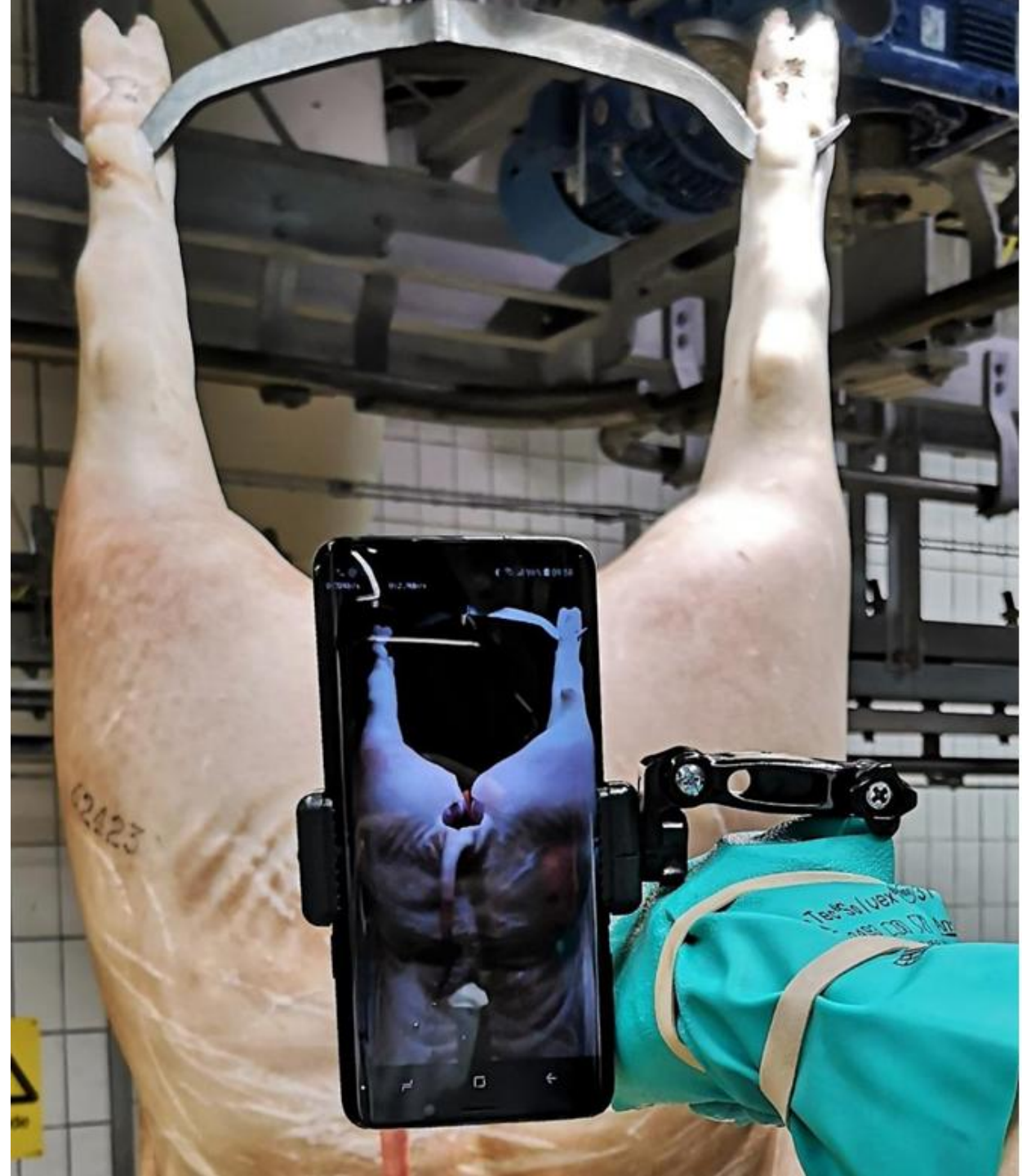
Why perform control at a distance?

Better sustainability of official controls

Higher level of resilience

Better logistics for food business operators

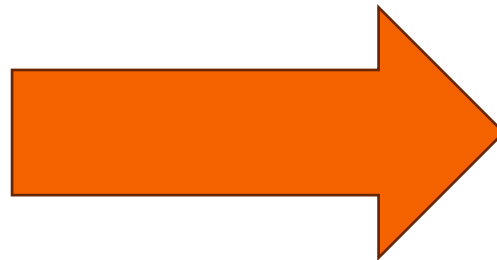
Lower costs of control



How would it work?



Sender



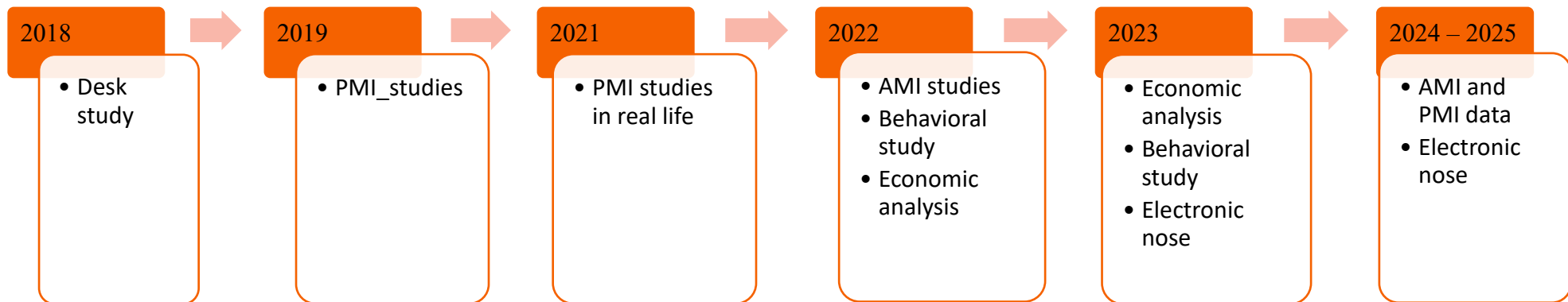
Receiver

The equipment

- Simple
- Smart
- Available
- Usable



Timeline of the project



Almqvist et al., 2021

Kautto et al., 2022

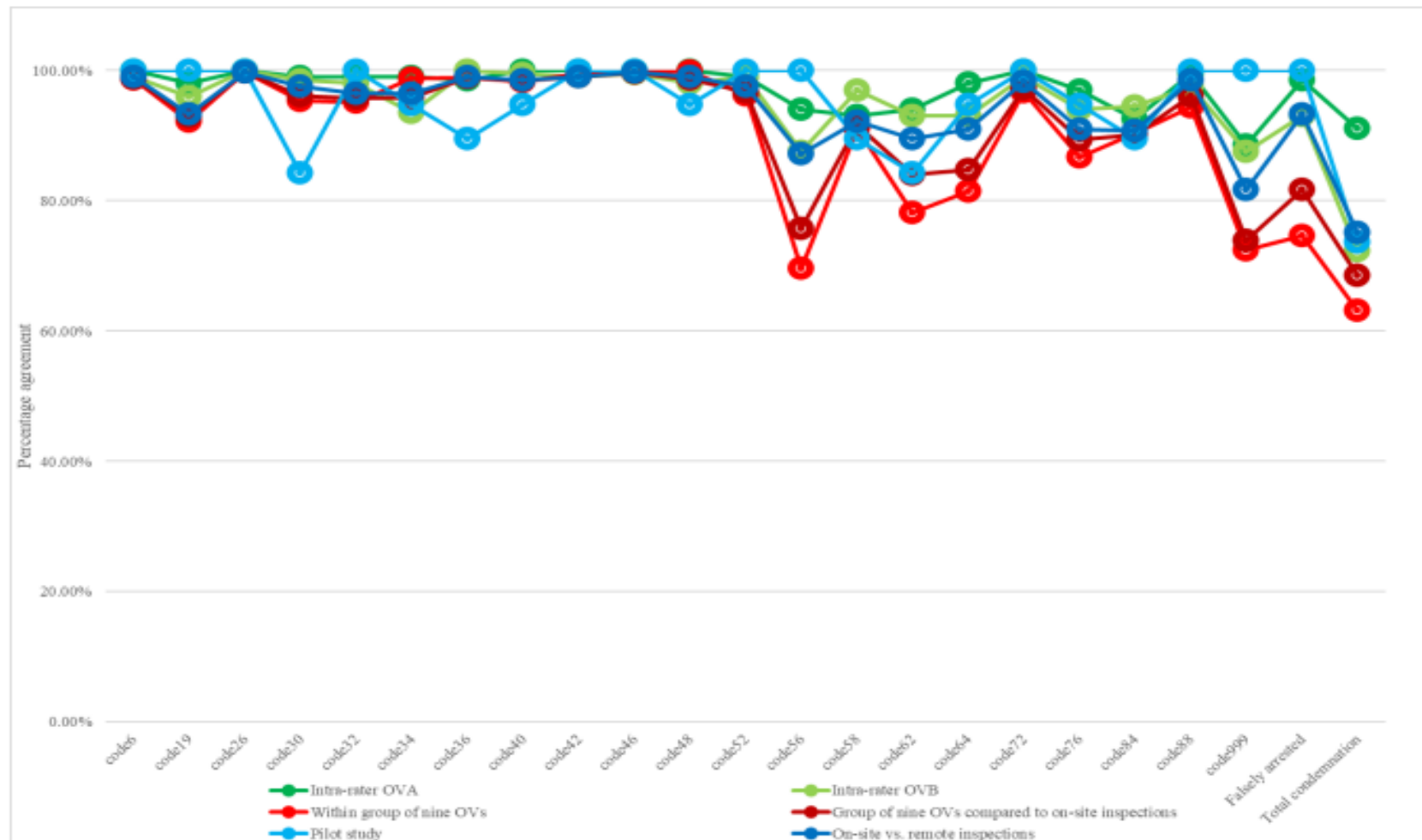
Kautto et al., 2023
Kautto & Comin., 2023
Almqvist et al., 2023
Hunka et al., 2023

Daniel et al., 2024
Hansson et al., 2025
Livsmedelsverket, 2025

Remote PMI-study

- 400 pig carcasses and organs
- Performing PMI in different settings
- High agreement

Variation between veterinarians not depended on the method of PMI



See further Almqvist 2021, PhD, thesis No.2021:72 , Swedish Univ. Agr. Sciences.

Remote PMI – on the production lines

Materials and methods

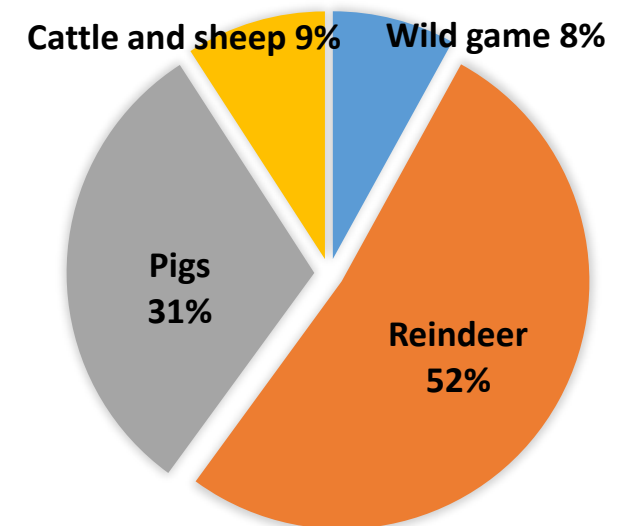
- Smartphone – WiFi on-site, fiber net (100 MB)

Conclusions

- Food safety, animal health and welfare not compromised
- Smart phone a useful device
- Good technical assistance on-site needed



Kautto et al, 2022. J of Parasitology



In total 3273 carcasses, in six establishments

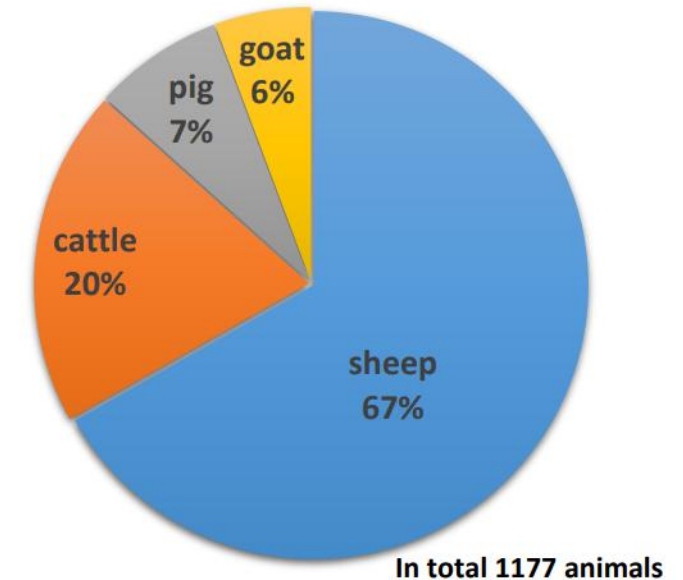
Ante-mortem inspection – at abattoir

Materials and methods

- Commercial soft ware (FaceTime®)
- WiFi in lairage, fiber (100 Mbit/s) at abattoir

Conclusions

- Inspection method do not affect negatively the possibility to find incompliances
- Emissions can be reduced in a great amount (89 % in this study)



Ante-mortem inspection – pig slaughter

Materials and methods

- Large-capacity abattoir processing pigs
- Inter-rater variability between two raters
- One person who was holding the smartphone camera whilst conducting an on-site ante-mortem inspection, and
- One remote rater (OV) conducting a remote ante-mortem inspection over a live video feed
- A total of 4032 pigs were inspected

Results

- Overall agreement between raters and kappa-value based agreements were almost perfect

Conclusions

Remote AMI is a feasible and flexible option provided the OVs are trained and aligned in their assessments.

Hansson et al., 2025. Remote antemortem inspection at slaughter in Sweden:

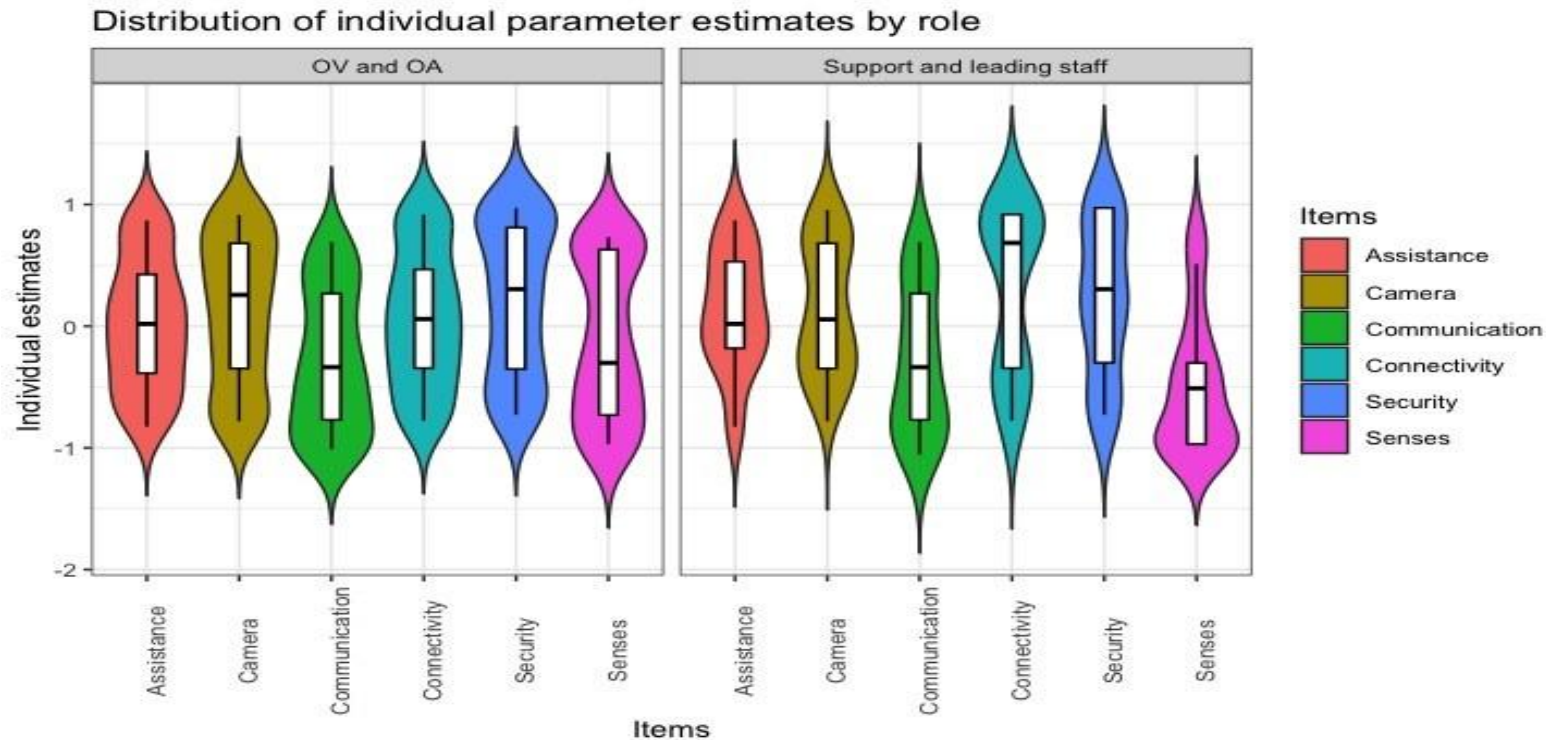
<https://doi.org/10.3389/frfst.2025.1603989>



Behavioral studies results – quantitative study

- Respondents rate security and fraud prevention (Security) as the most important aspect.
- Communication and Senses considered the least important aspects.

Answered by
54.7 %
of SFA's staff
dealing with
meat inspection

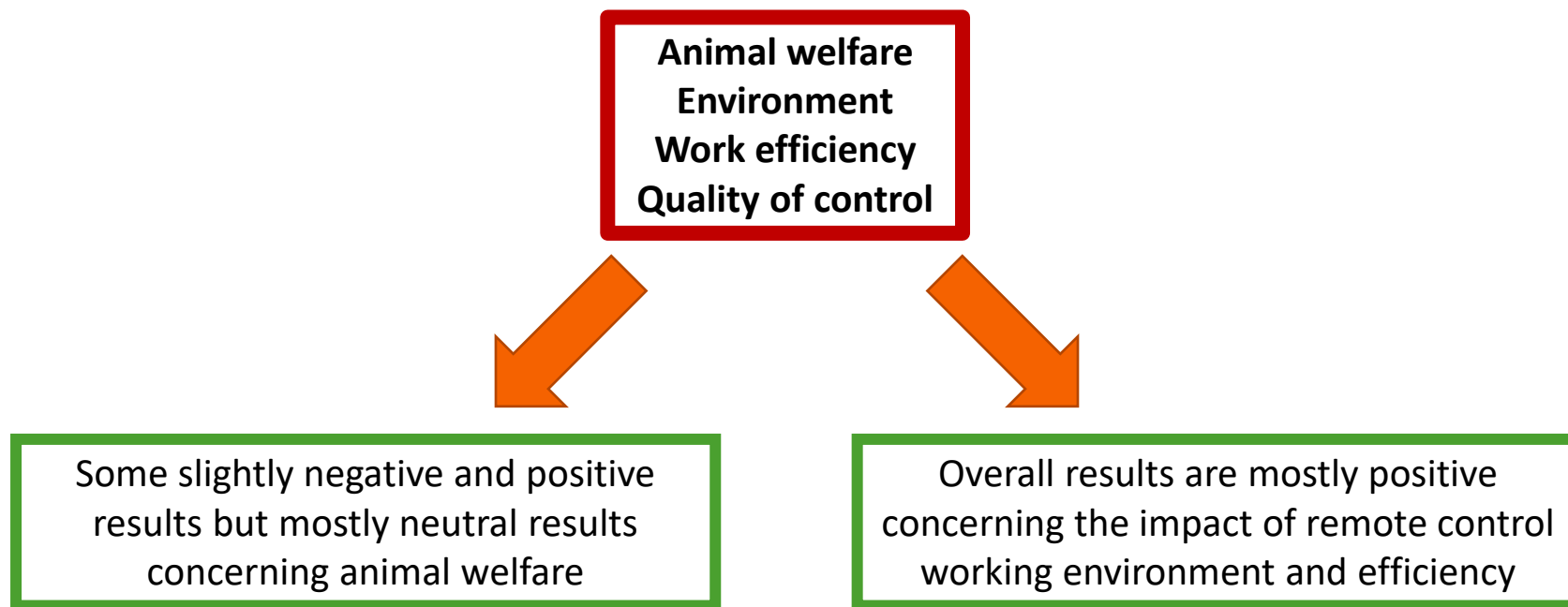


Daniel et al., 2024. Expert elicitation of remote meat inspection prerequisites in Sweden using best-worst scaling (case1):

<https://doi.org/10.1016/j.foodcont.2024.110460>

Behavioral studies results – qualitative study

Four hypothetical effect categories
according to the interviews of the control staff



Hunka et al., 2023. Official Control in Slaughter and Game Handling: Expectations and Prerequisites for Implementation of Remote Meat Inspection in Sweden: <https://doi.org/10.1016/j.jfp.2023.100196>

Electronic nose

Detection of abnormal odours at slaughter

- Developed in-house
- Based on AI and off-the-shelf-components

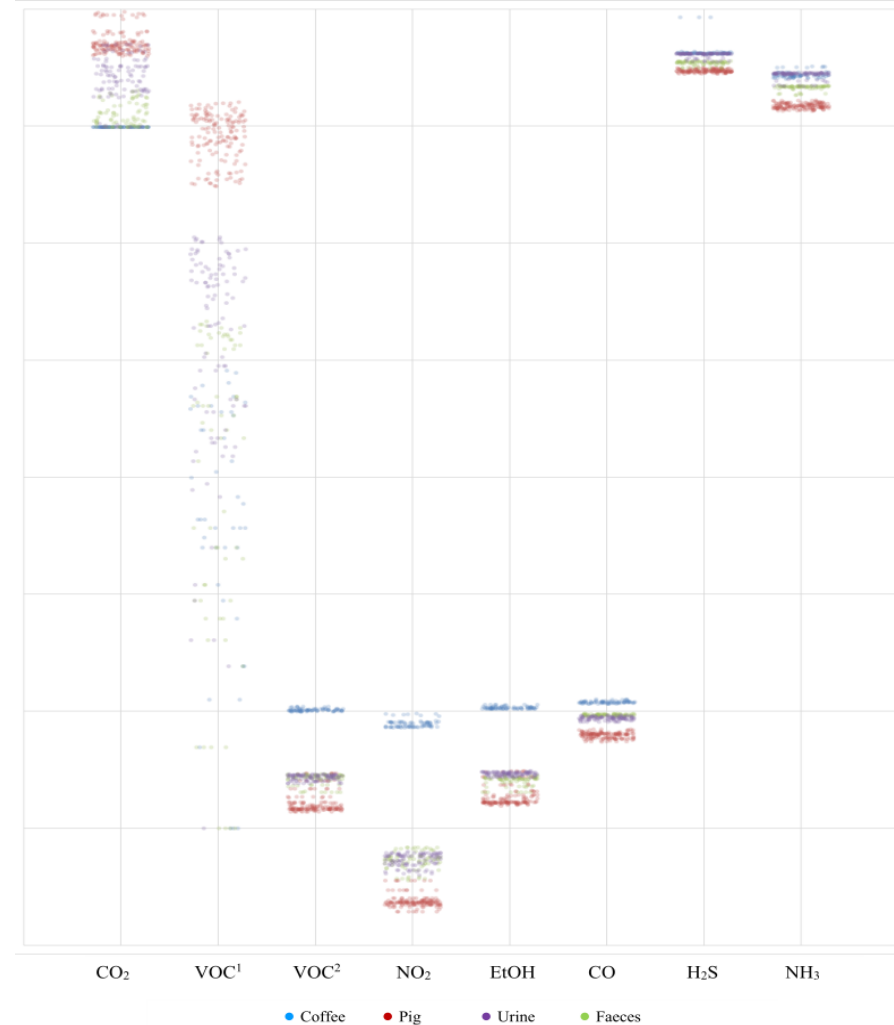
Scents and odours are highly subjective!

- Standardised measurements and assessments of odours at slaughter
- Reduced food waste and increased equality



The insides of the electronic nose exposed.
11 different sensors in total.

Electronic nose readouts of sensors for specific chemicals and test-subjects



Does a pig smell like coffee?

Readouts from various sensors in the e-nose.
Non-overlapping lines indicates difference in smell

Model for remote ante and post-mortem inspection

- A possibility
- Following categories of animals are proposed for remote controls:
 1. Domestic ungulates – ante and post-mortem inspection
 2. Farmed game - ante and post-mortem inspection
 3. Wild game – post-mortem inspection



Conditions for remote ante and post-mortem inspection

- Compliance
- Technical prerequisites
- Requirements and training
- On site visits required sometimes
- Animal health status

Conclusion - The future is near

- Ante-mortem and post-mortem inspections can be done remotely using smartphone and standard personal computer.
- Certain conditions needs to be met.



Other analyses performed

- Technical issues and IT-security
- Economical analysis – obvious advantages
 - Less transportations
 - Working hours used more reasonable
- Environmental effects
 - Less CO₂ emissions
 - Better resilience during top season

For further information and references, please see the homepage of the Swedish Food Agency: [Remote meat control in slaughter and game handling](#)



**In a near future
hopefully
technology can
take us closer!**

Project powered by:

Swedish Food Agency

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