Remote Meat Inspection

-

flexibility for sustainability in small scale slaughter and game handling

Rimbins 3th Scientific Conference

29 - 30 March 2023

Arja Helena Kautto, DVM, Dipl. ECVPH, Swedish Food Agency and University of Agricultural Sciences, Uppsala

&

Arianna Comin, DVM, PhD, Swedish National Veterinary Institute

Challenges in meat inspection

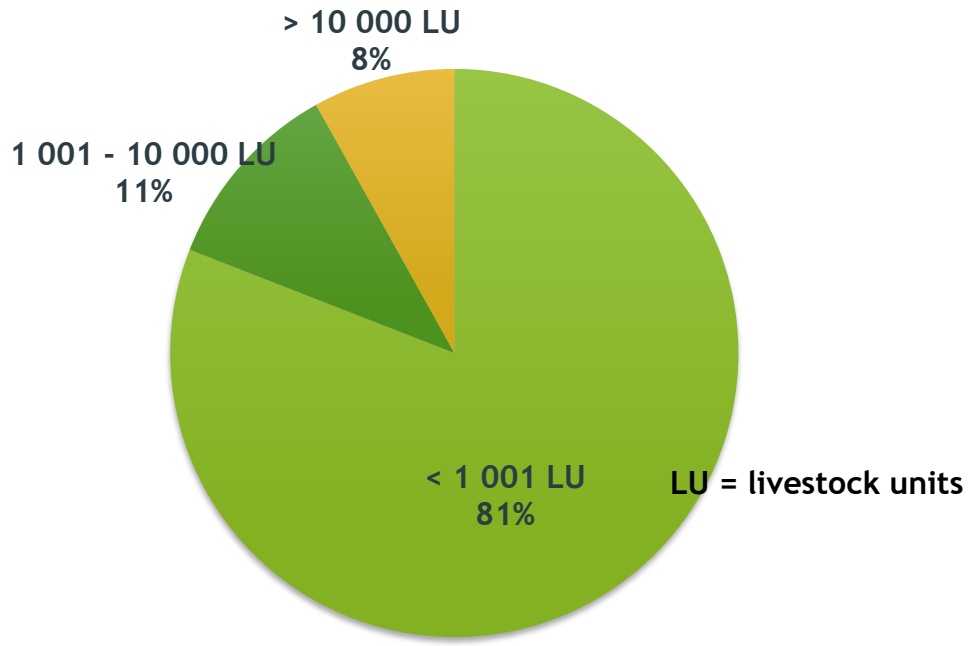
- Meat control to be done on-site
- Calibration difficult to be done
- Logistical problems for food businesses
- Working environment
- Reasonable use of veterinary competence

Swedish red meat production – infrastructure

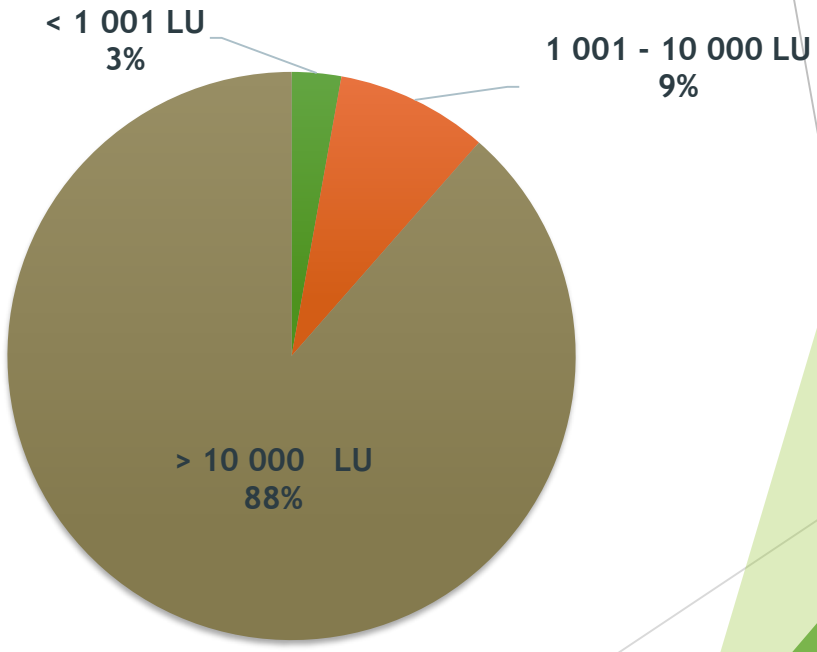
Locally produced food

Shorter transports of animals

Size of establishments



Throughput volume



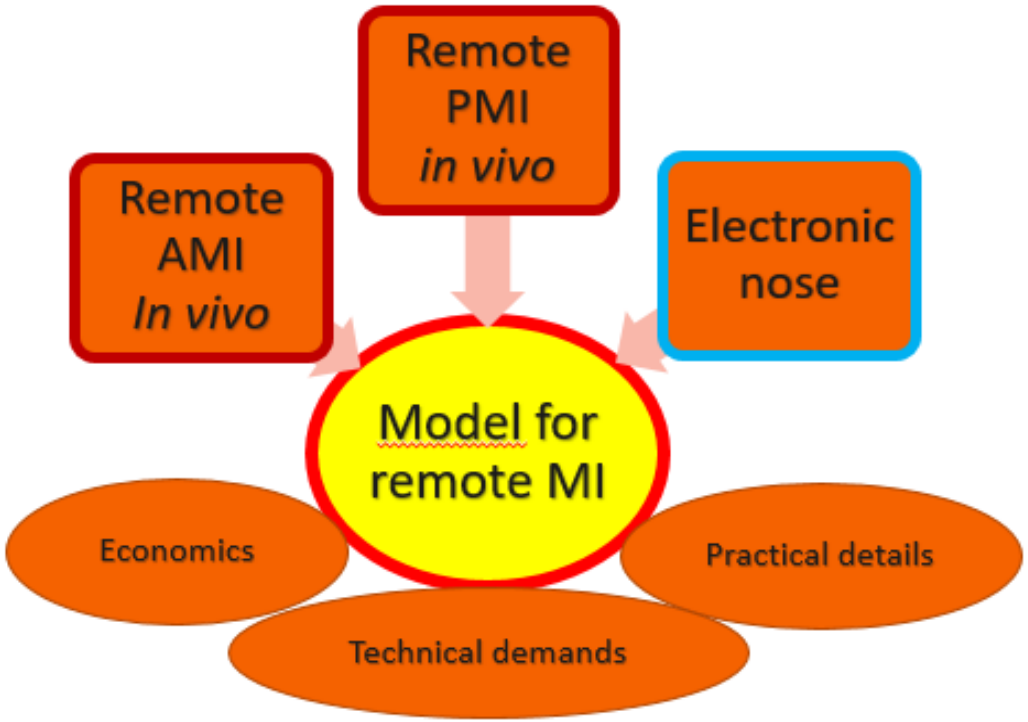
Incentives in Swedish context

- Higher level of sustainability
- Higher level of resilience
- Better logistics for FBO
- Lower costs of control

Remote meat inspection model

Model study 2021 -2023

All the time meeting the goals for good food safety, animal welfare and animal health !!!



Studies done and on-going

2018
- Desk study at the agency, what to do, how and when

2019
- Evaluation of the feasibility remote control, augmented reality

Almqvist et al., 2020

Almqvist et al., 2023

Almqvist et al., 2023

2021
- Feasibility in small scale slaughter and game handling, post mortem

Kautto & Comin, 2023

2022
- Feasibility in small scale slaughter ante mortem
- Behavioral study
- Economic
- analysis

Kautto et al, 2023

2023
- Publication on-going
- Economic analysis
- Behavioral study
- Electronic nose

Hunka et al., 2023

Post-mortem – by smartphone and pc

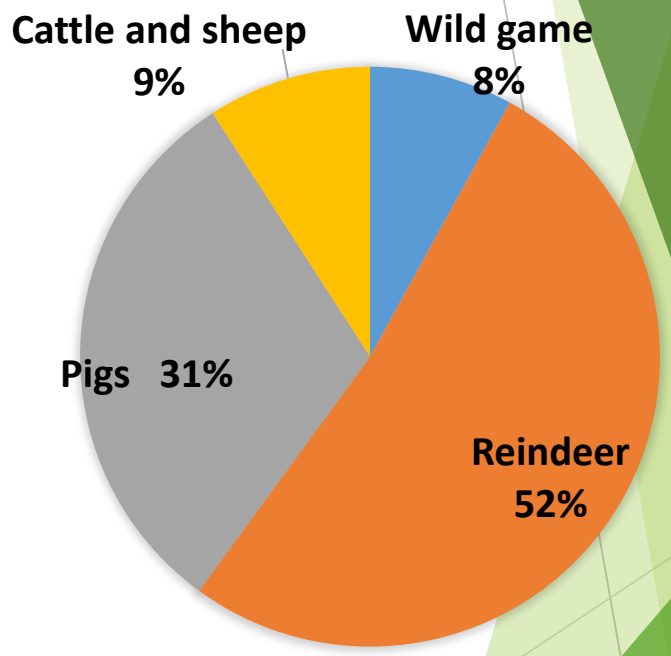
Material and methods

- Smartphone – WiFi on-site, fiber net (100 MB)
- Pc – WiFi at the office, fiber net (100 MB)
- Own software (JITSI) to measure datalosses
- Six establishments, many OV on-site
- Two research veterinarians on remote basis
- PMI codes used Swedish Food Agency standard instruction

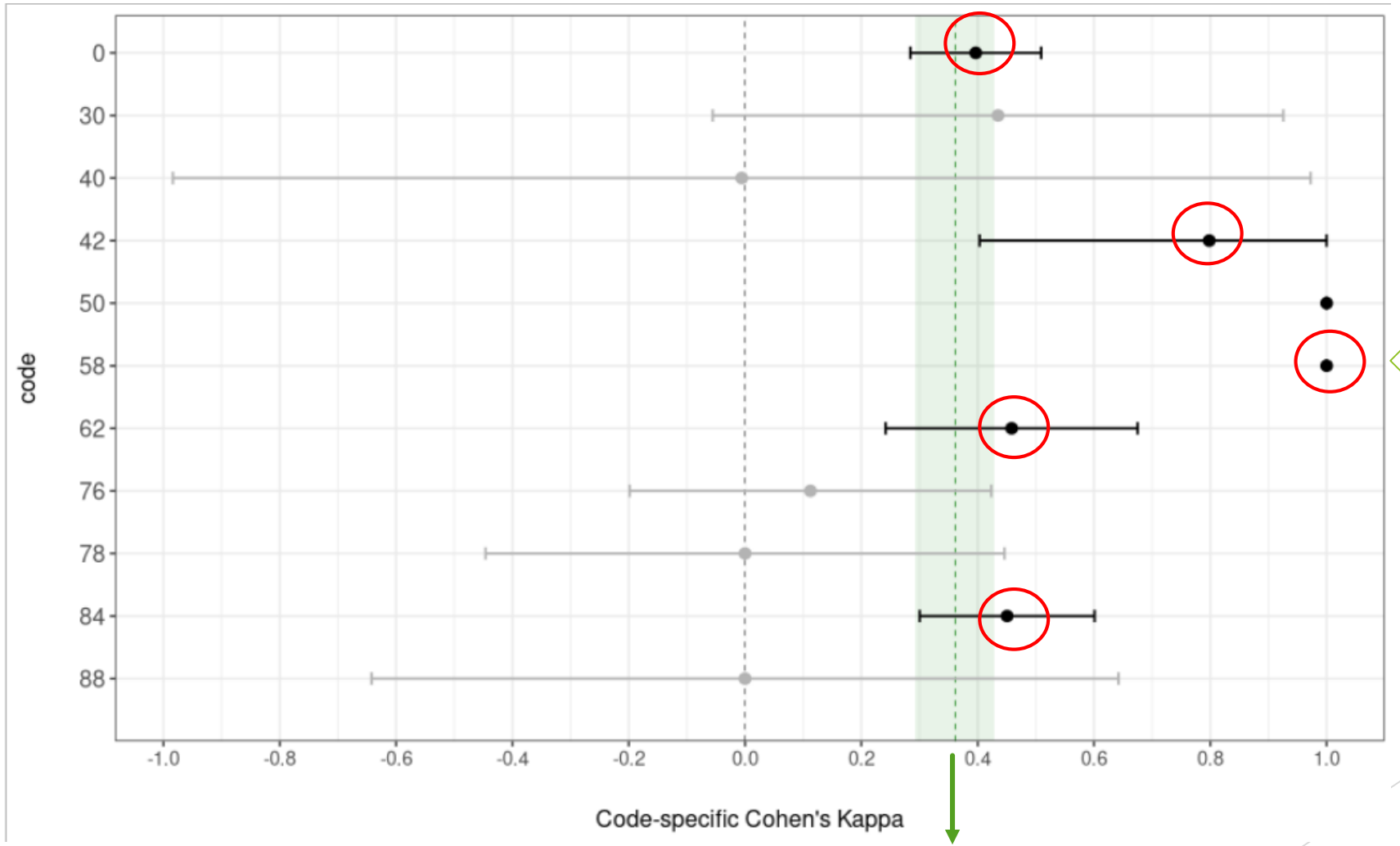
Post-mortem – by smartphone and pc

Material and methods

- Base line measurements done on-site
- Technical support slaughter house staff on-site
- PMI performed on many animal types,
- In total 3 273 carcasses checked remotely
- Data analysis by kappa analysis



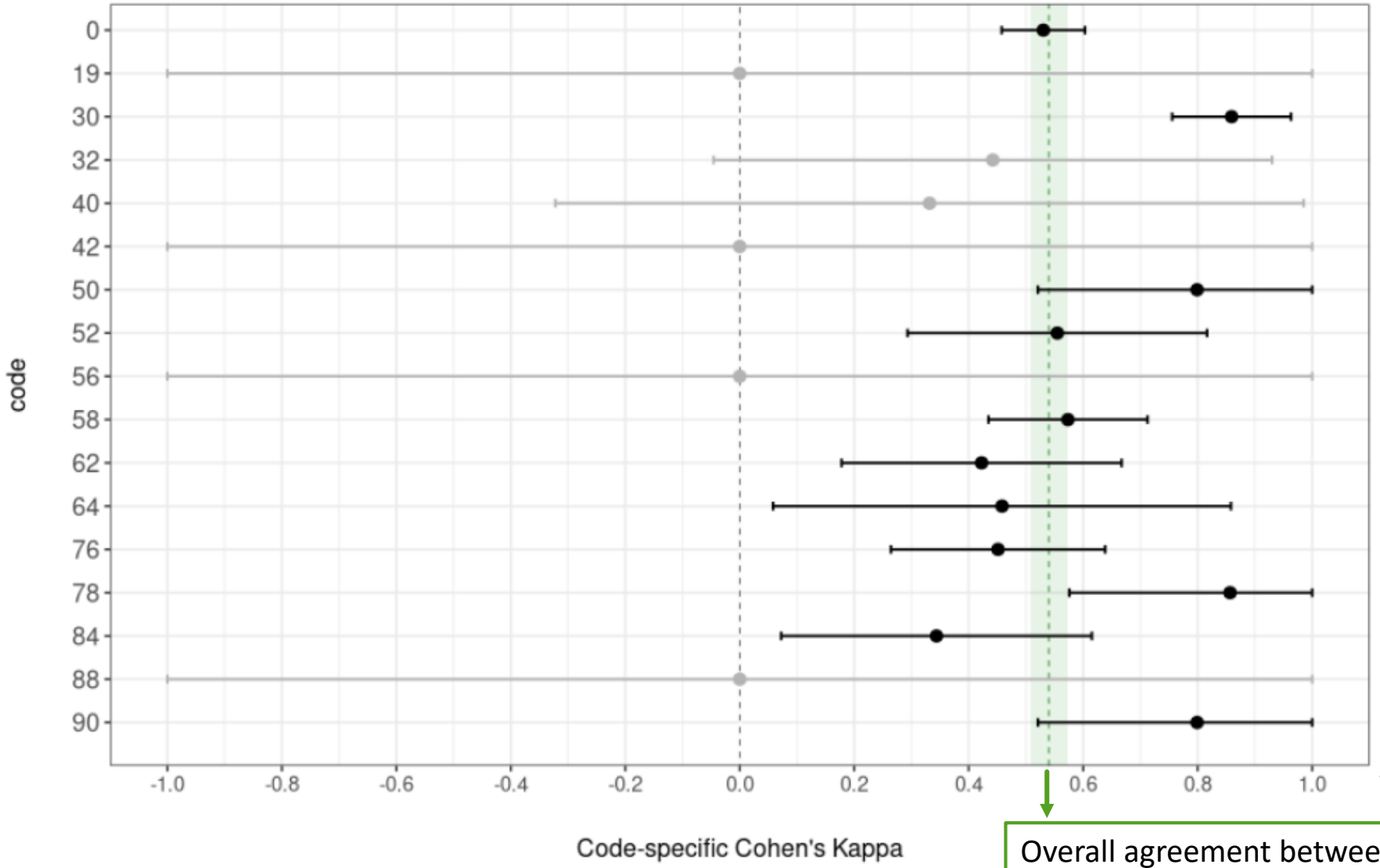
Cohen's Kappa for each finding - pigs (n=243)



Basline comparison: both inspectors on site

Overall agreement between raters
Fleiss' kappa: **0.36 [0.29 – 0.43]**

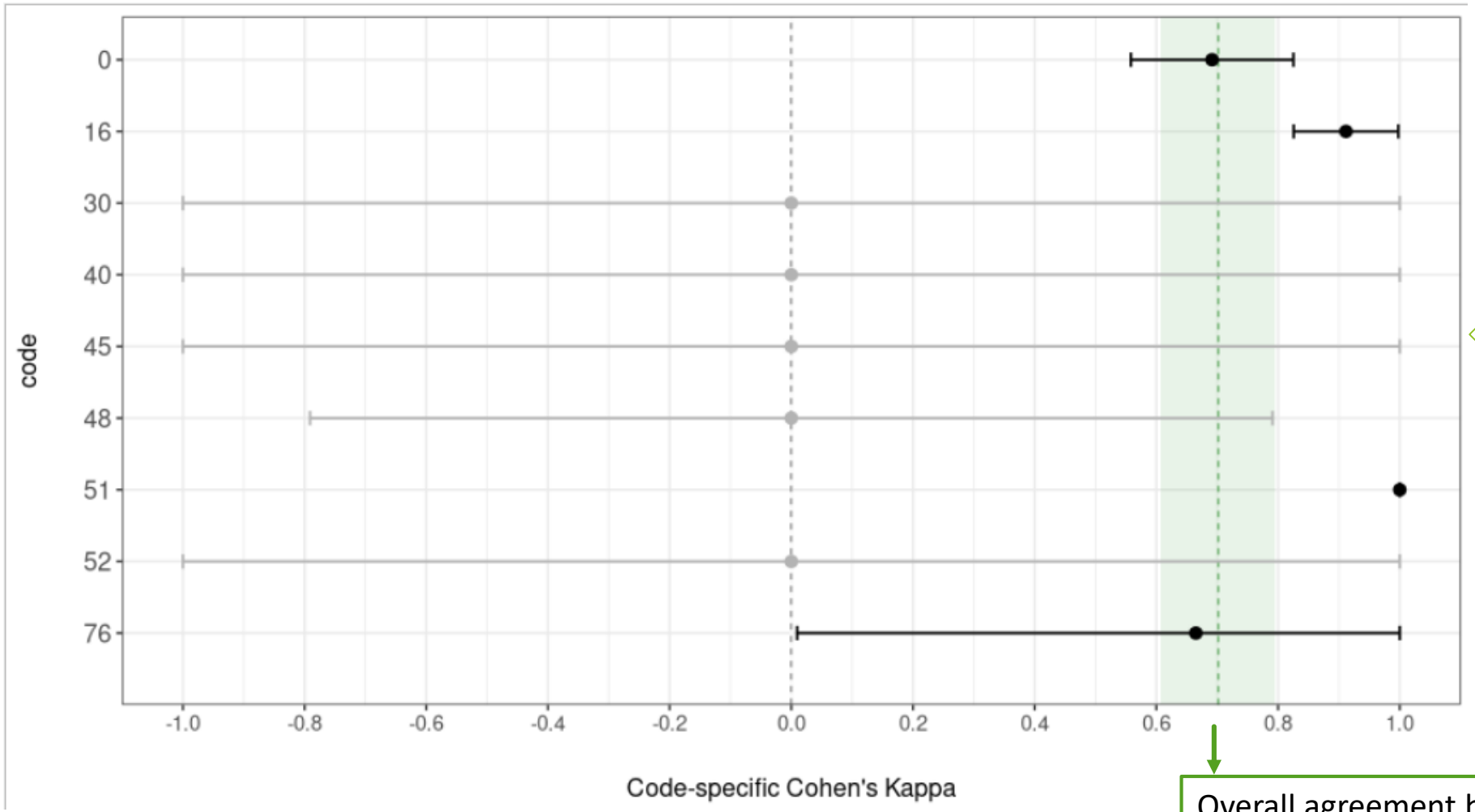
Cohen's Kappa for each finding – pigs (n=1063)



Remote vs. on site inspection

Overall agreement between raters
Fleiss' kappa: **0.54 [0.51 – 0.57]**

Cohen's Kappa for each finding – GHE (n=262)



Remote vs. on site inspection

Overall agreement between raters
Fleiss' kappa: **0.70 [0.61 – 0.80]**

Unique finding in reindeer – on remote PMI

Taenia lynciscapreoli first time found in reindeer (*Rangifer tarandus tarandus*)

Kautto et al, 2022. *Taenia lynciscapreoli* in reindeer

Post mortem – by smartphone and pc

Conclusions

- The bandwidth at PMI-position needs Wi-Fi
- Smartphone a useful device
- Good technical assistance on-site needed
- Video quality on pc good enough
- Sound quality on pc good enough

Post mortem – by smartphone and pc

Conclusions

- Inter-rater variability exists
- Some codes more consistent than others
- Remote control method does not negatively affect the reliability
- Food safety, animal health or animal welfare not compromised

- Possibility to on-site visit remains
- Training needed
- Follow up was done as in every control method

Our future vision

Meat inspection can be done on distance

- when circumstances good enough
- with good enough help and technical devices
- by well trained control staff

Sustainability
Resilience
Good working environment

Thank you for your attention!

© A.Kautto