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ANIMAL WELFARE INDICATORS AT THE SLAUGHTERHOUSE

Validation study on automatic assessment of footpad dermatitis and hock burn in broilers

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Funded by the European Union

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Introduction

- **Footpad dermatitis (FPD) and hock burn are common welfare problems in broilers approaching slaughter weight**
  - Poor litter quality (moisture, ammonia)
  - Low activity levels, high stocking density
- **On-farm assessment is challenging: requires catching and handling of birds**
- **EU broiler directive (2007): mortality and FPD scores as animal-based measures**
- **Automated monitoring at slaughter has major advantages**

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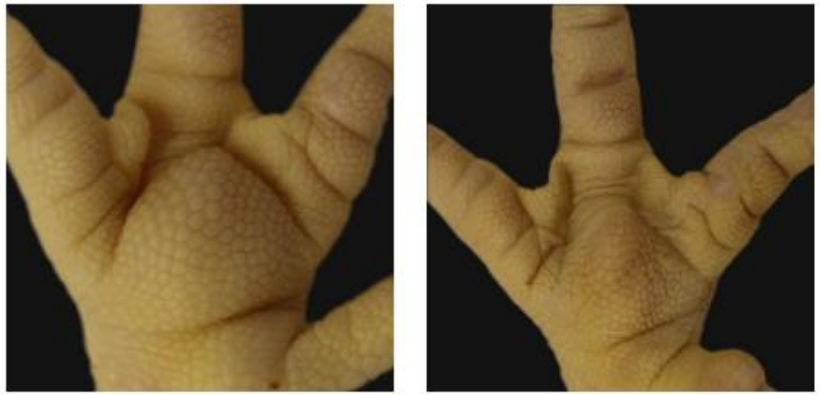
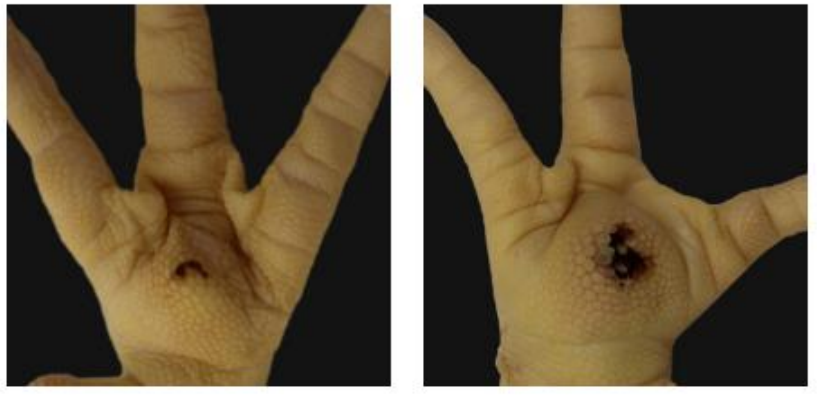
Scores: four categories (% foot pad affected)

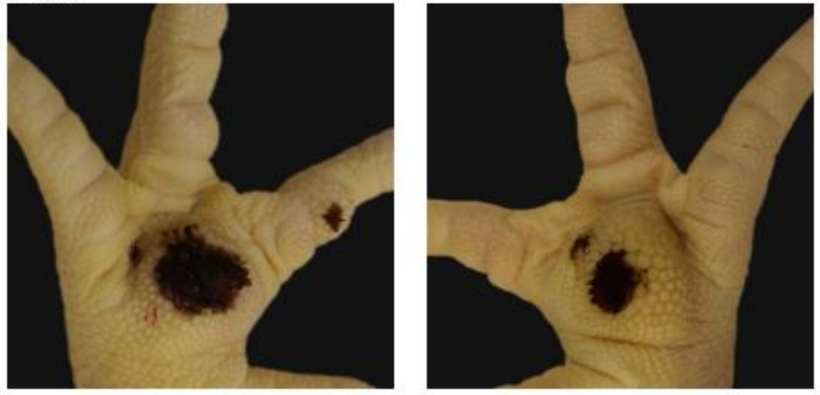
Stufe 0



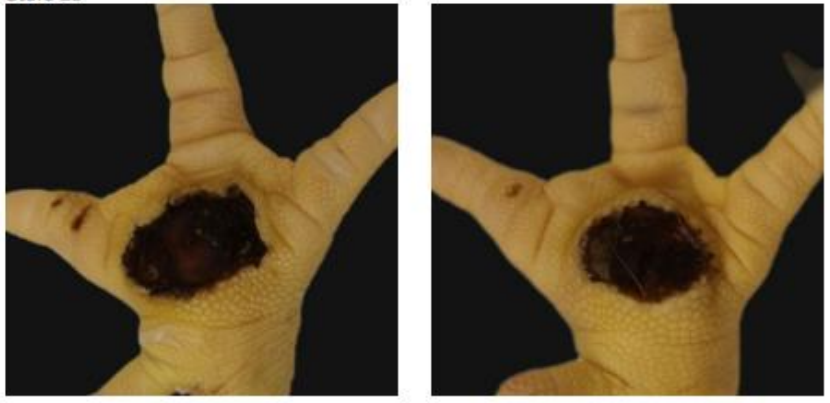
Stufe 1



Stufe 2a



Stufe 2b



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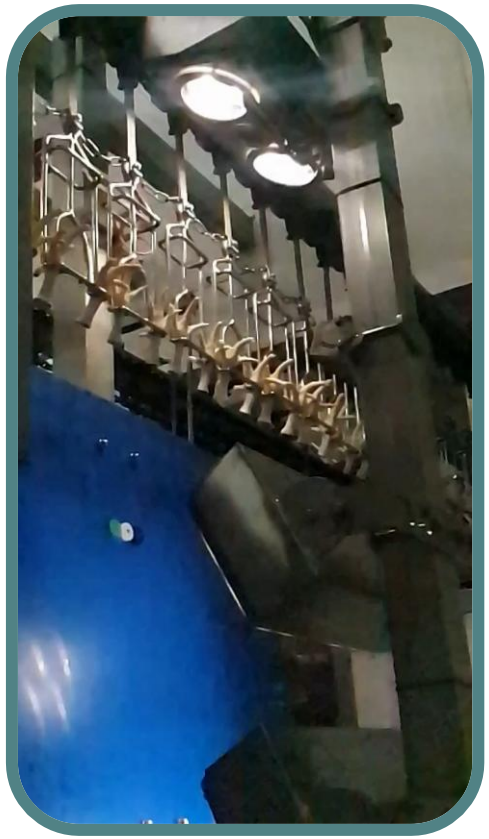
Measures the average percentage of lesions on the sole.

Camera system at the return line of the legs. The associated algorithm detects the lesions through color differences, where the lesion area determines the severity.

Overview System



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CHICKENCHECK FOOTPAD

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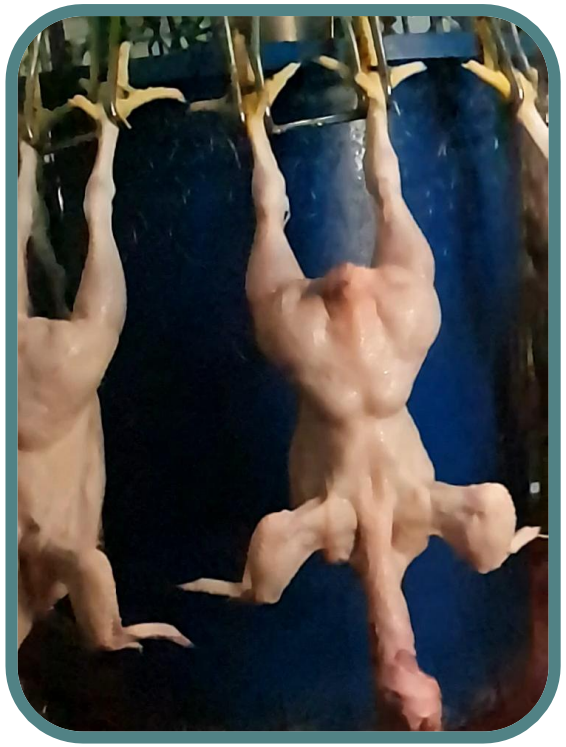
Measures the area (mm²) of hock burns

Camera system immediately after the plucking of the animals. The associated algorithm detects the burn marks through color differences, where the burn mark area determines the severity.

Overview System



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NEW

CHICKENCHECK HOCKBURN

Validation FPD

Internal validation study FPD (Louton et al., 2022)

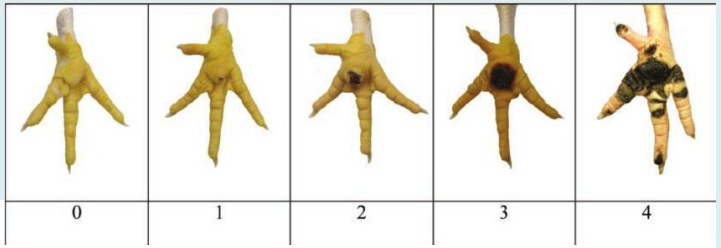
- Five point scale (0-5)

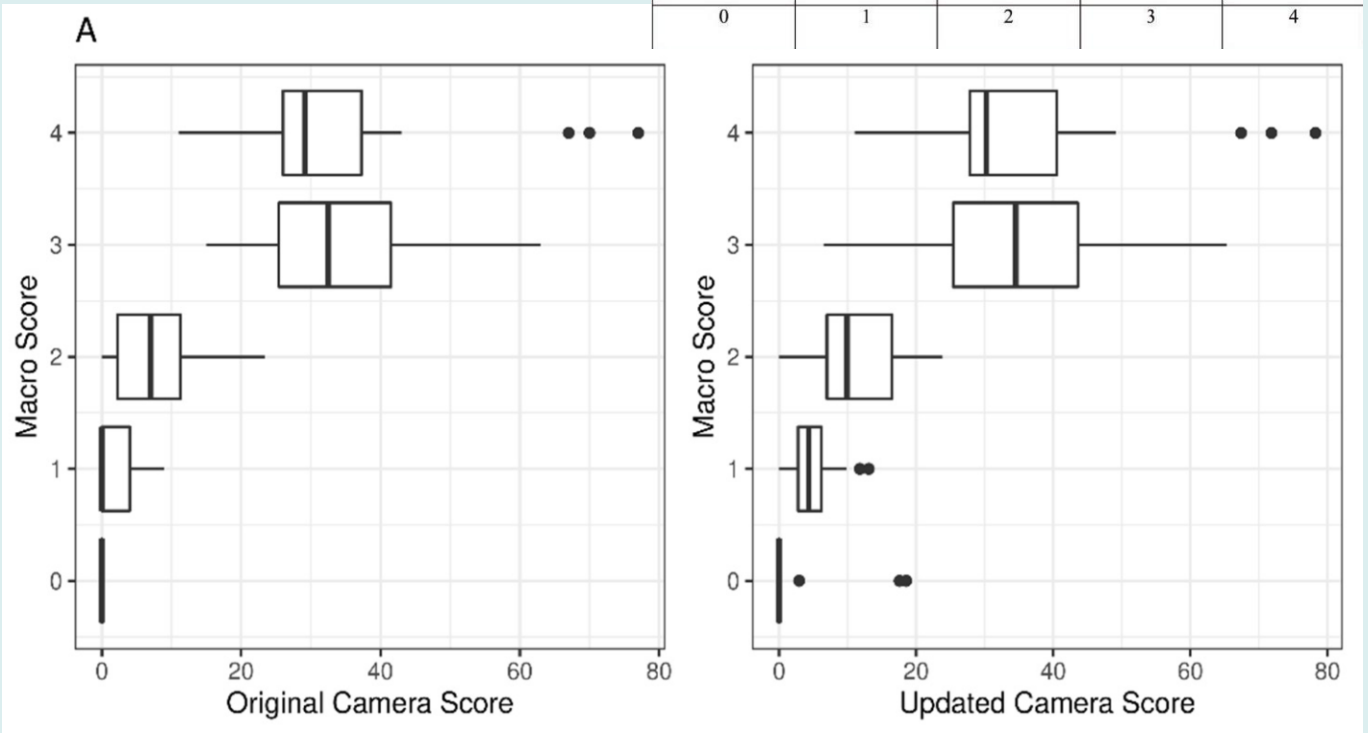
- 200 feet for calibration

  500 feet for validation

Score by trained observer and by the automated system

Scores 0, 2 and 3 could be identified with sufficiently high sensitivity





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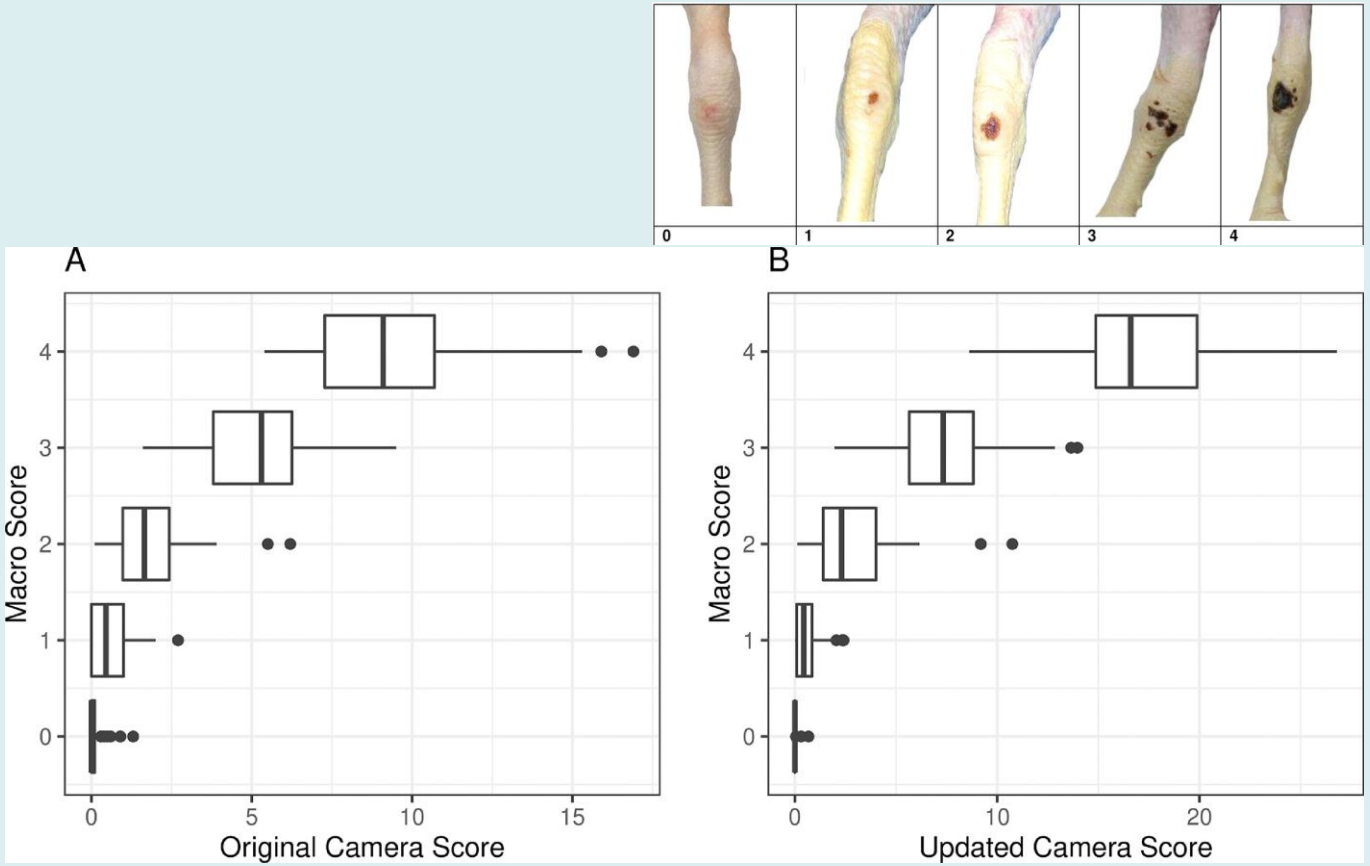
Validation hock burn

Internal validation study hock burn (Louton et al., 2022)

- Five point scale (0-5)
- 200 hocks for calibration
  500 hocks for validation

System able to separate small and large lesions

Large lesions more reliably identified than small lesions



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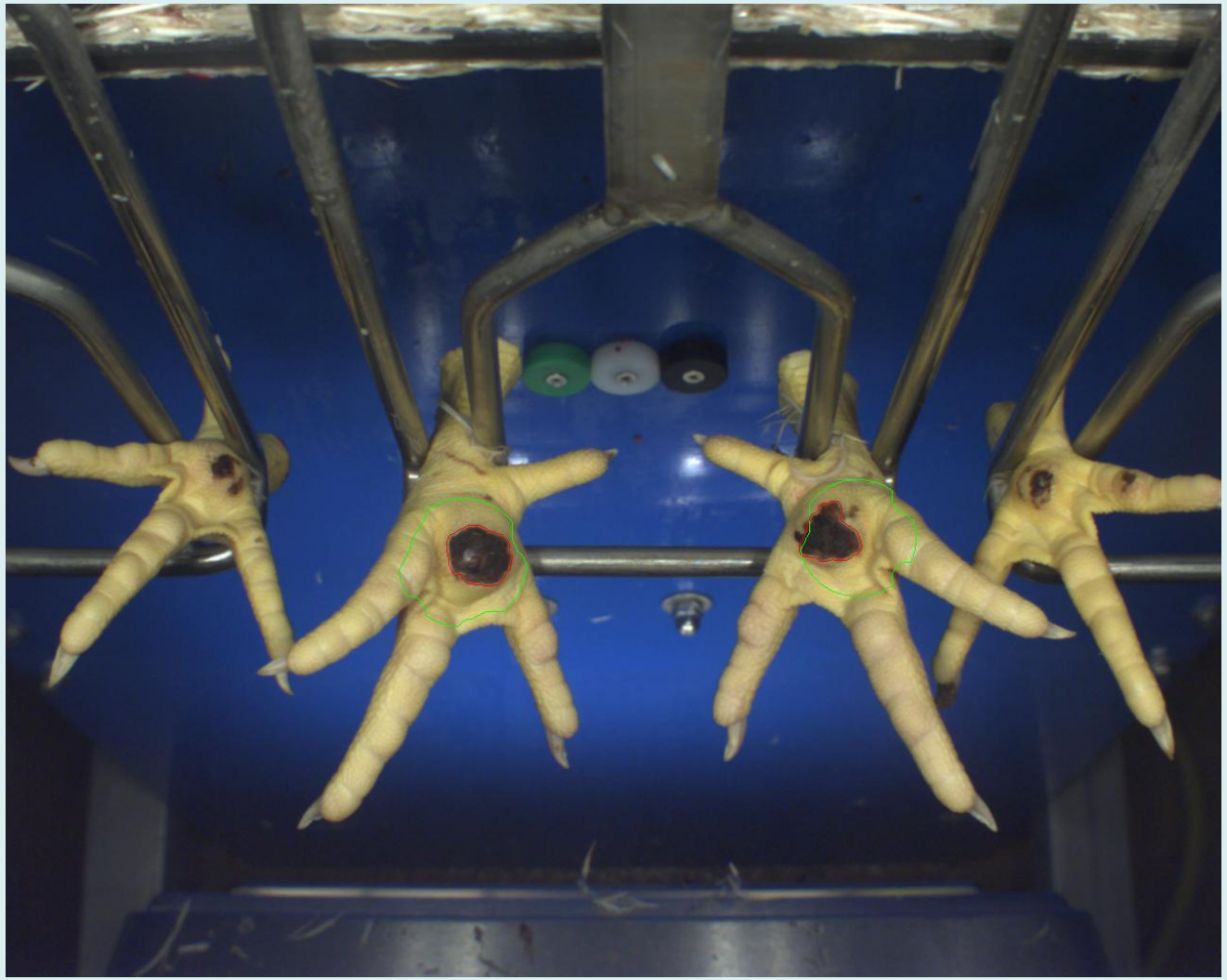
aWISH Validation study FPD + hock burn



Three human assessors

Experience with FPD and hock burn scoring

Pictures from two slaughterhouses (FR and PL)

Training data set of 50 images (100 feet and hocks): agreement on scores

Validation data set of 500 images (1,000 feet and hocks): comparison humans and system

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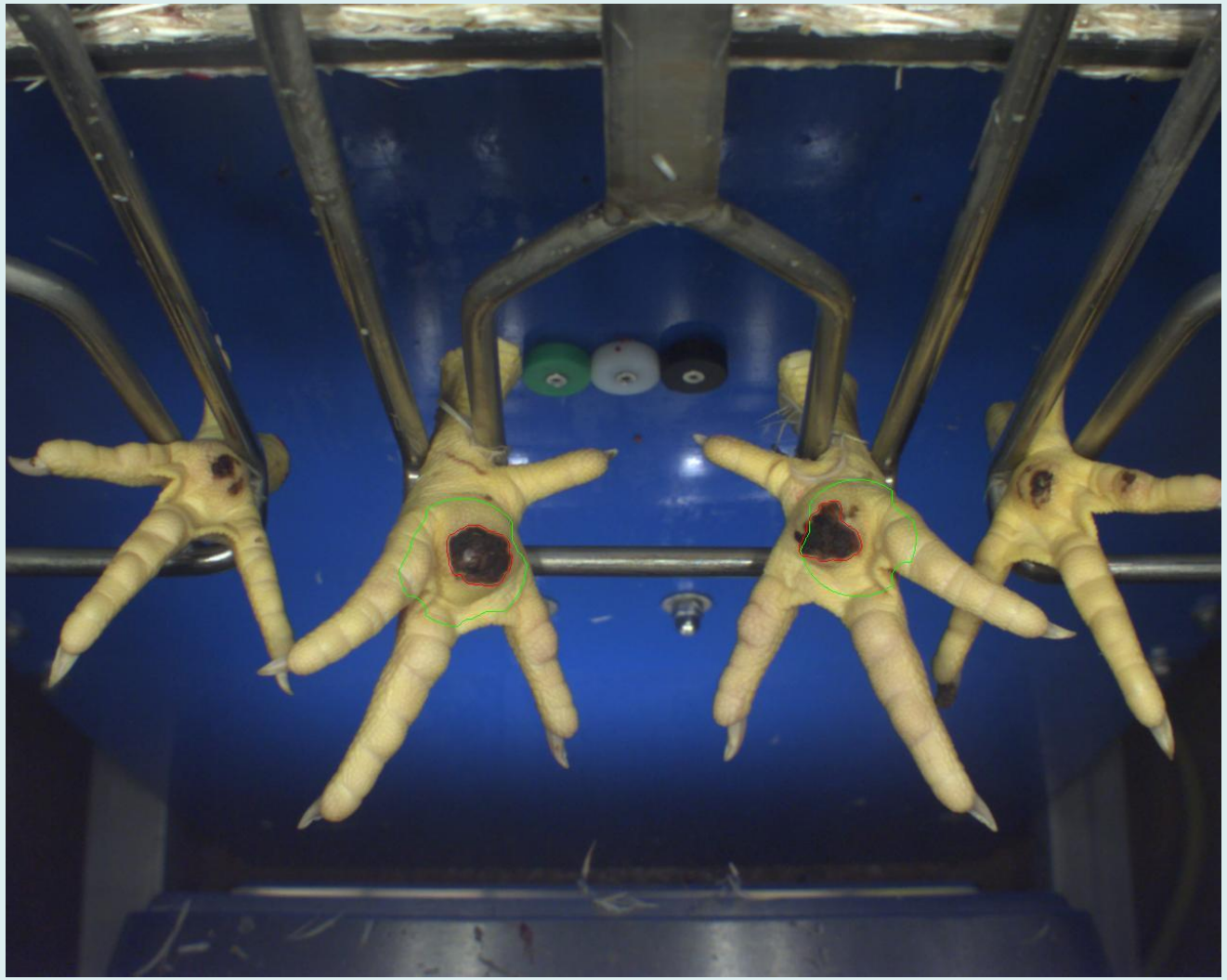
aWISH Validation study FPD + hock burn



Scorer1: Score 2b
Scorer2: Score 2a
Scorer3: Score 1

CLK: 26% -> Score 2a

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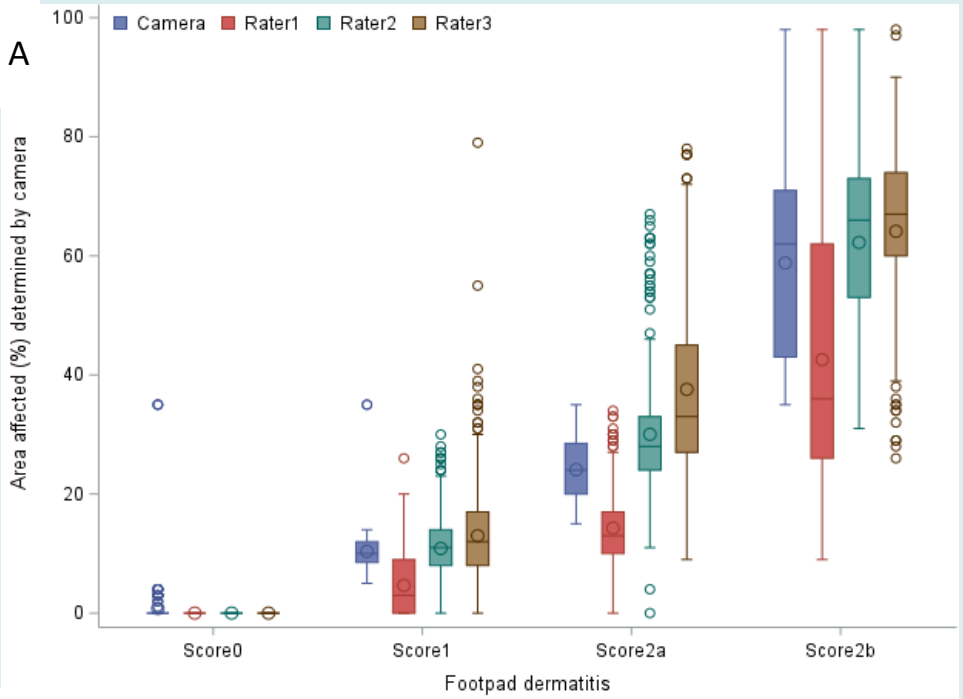
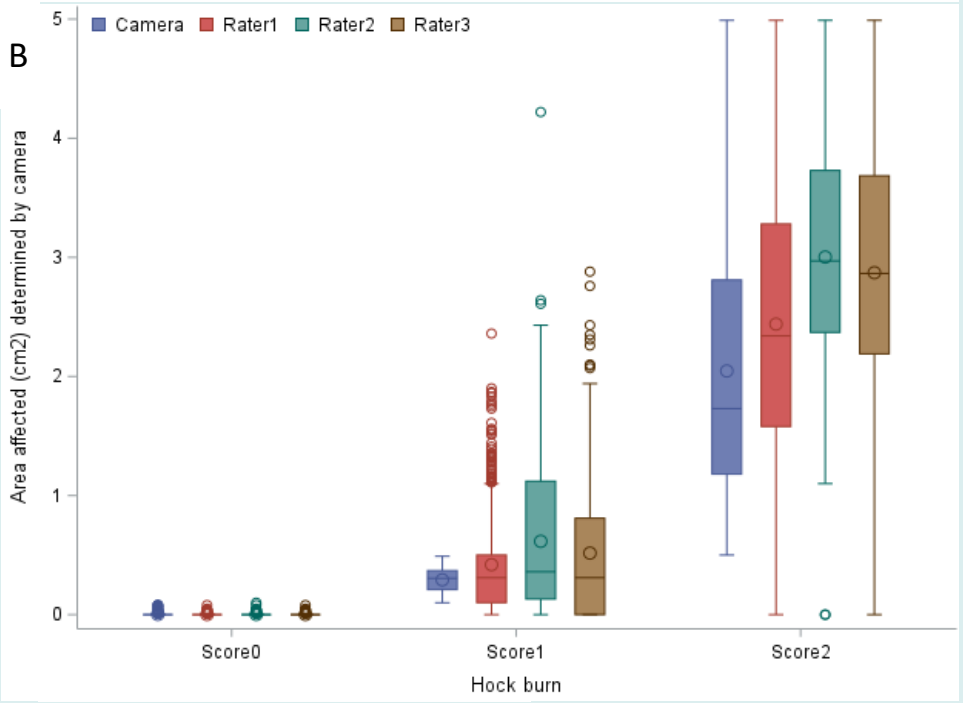
Validation of welfare indicators

Humans: fair to moderate agreement (kappa 0.33-0.47)

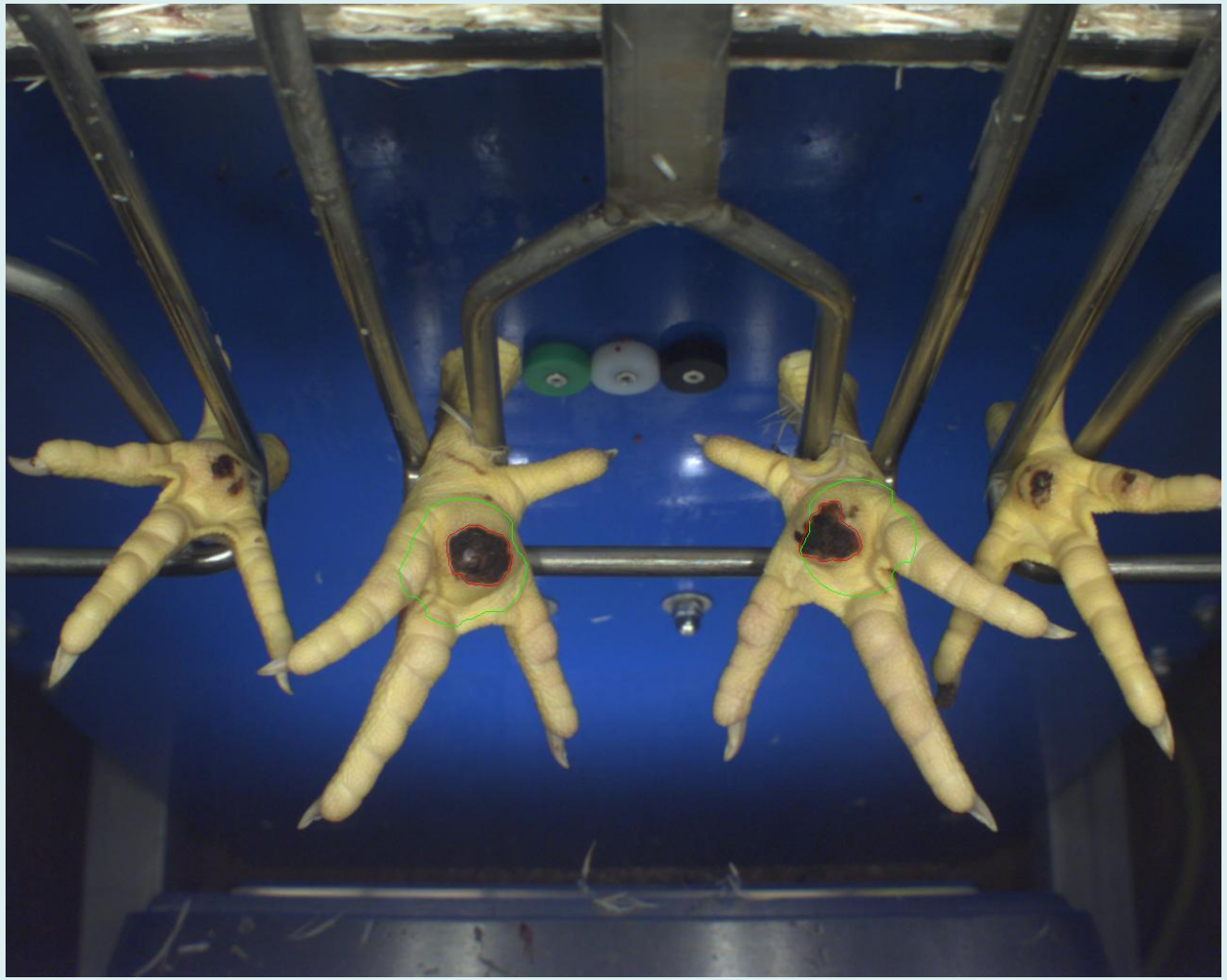
With system: moderate to substantial agreement (kappa 0.60-0.70)

Hard for human to assess size or % affected area





aWISH Validation study FPD + hock burn



Adjusted method of validation:

Compare size of selected area

Drawn by human assessor vs. system

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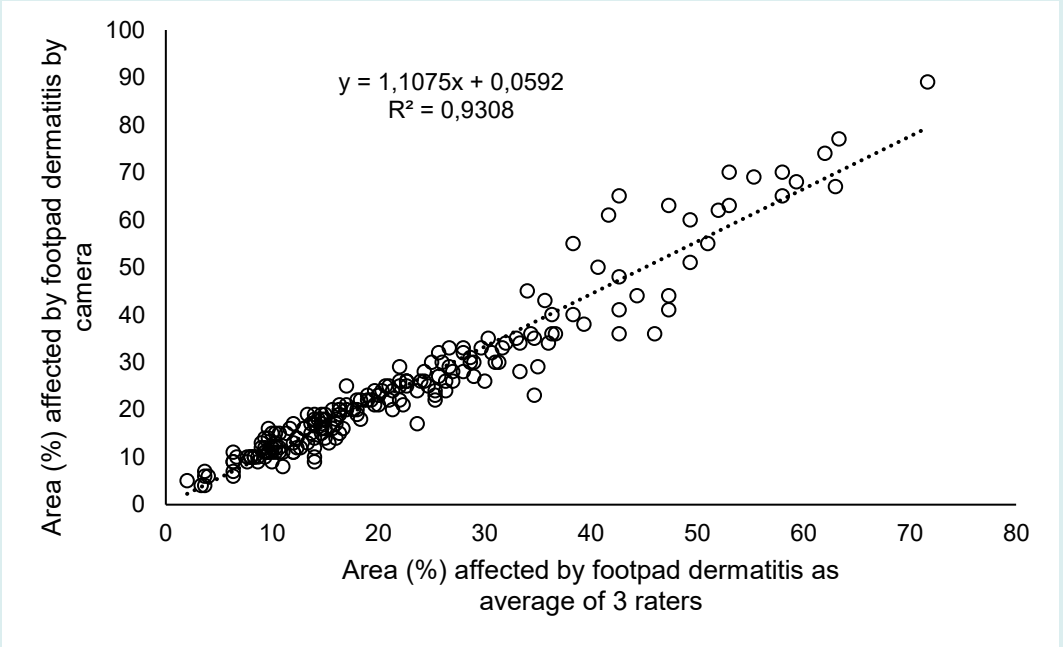
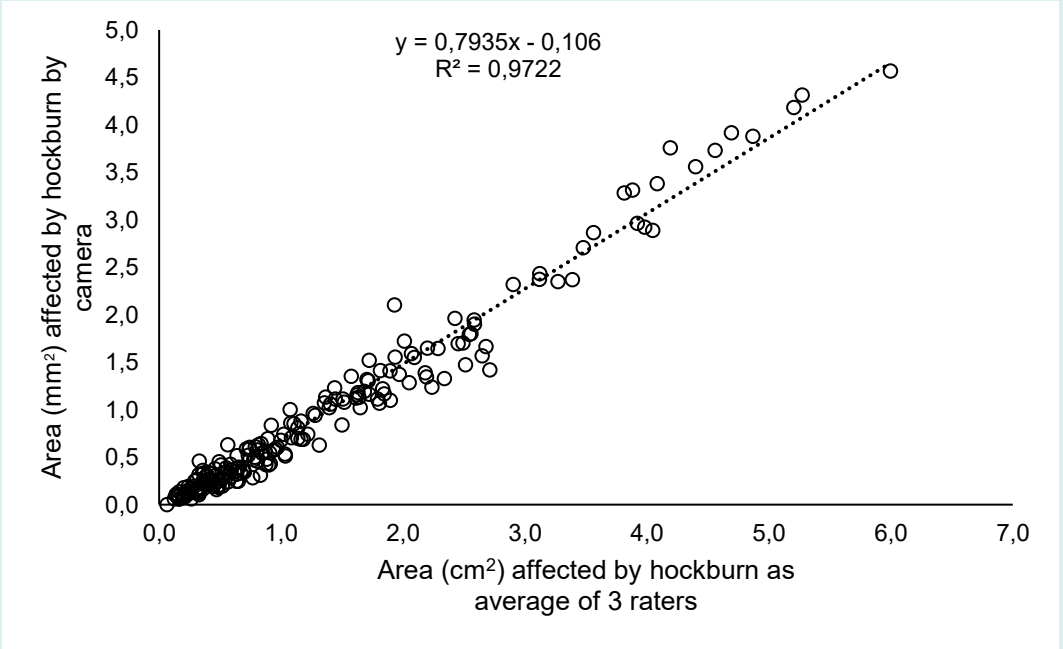
Comparison size selected area

Human assessors and camera system indicated a similar size of lesions on the footpad (R^2: 0.93) and hock burn (R^2: 0.97)

Size of lesions is correctly annotated by the ChickenCheck system





Development of measures over time

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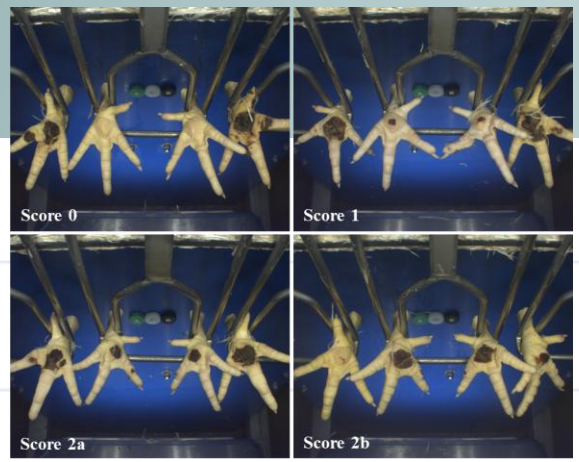
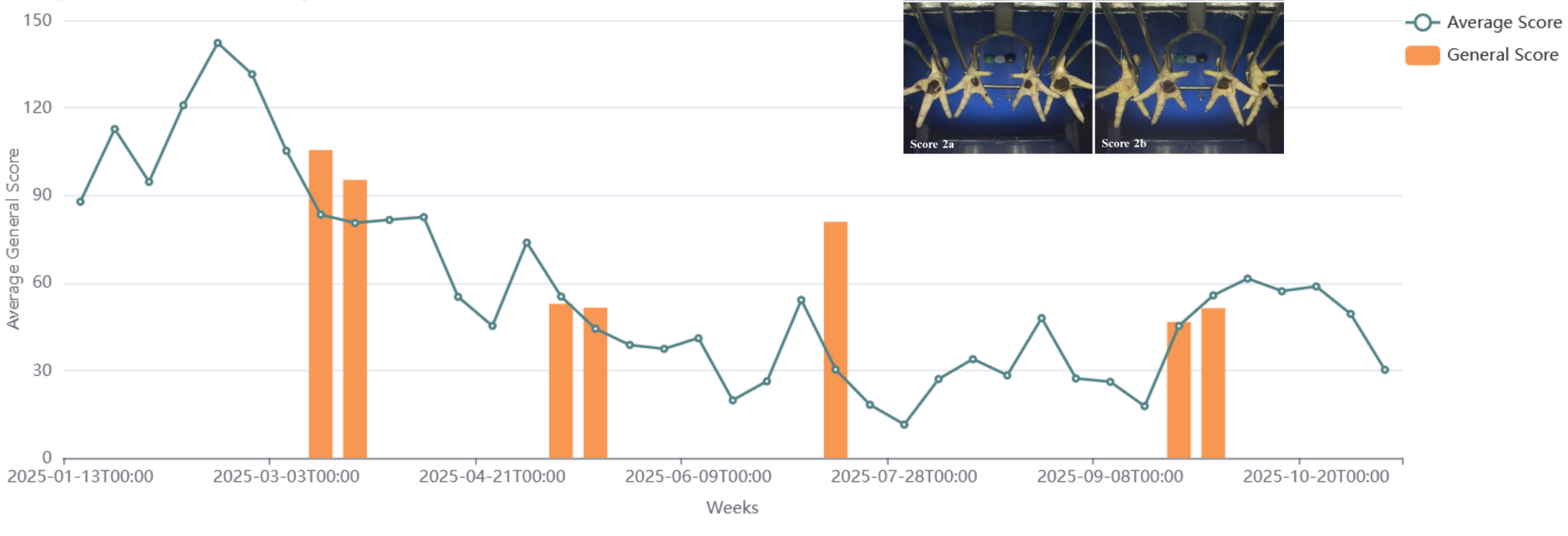
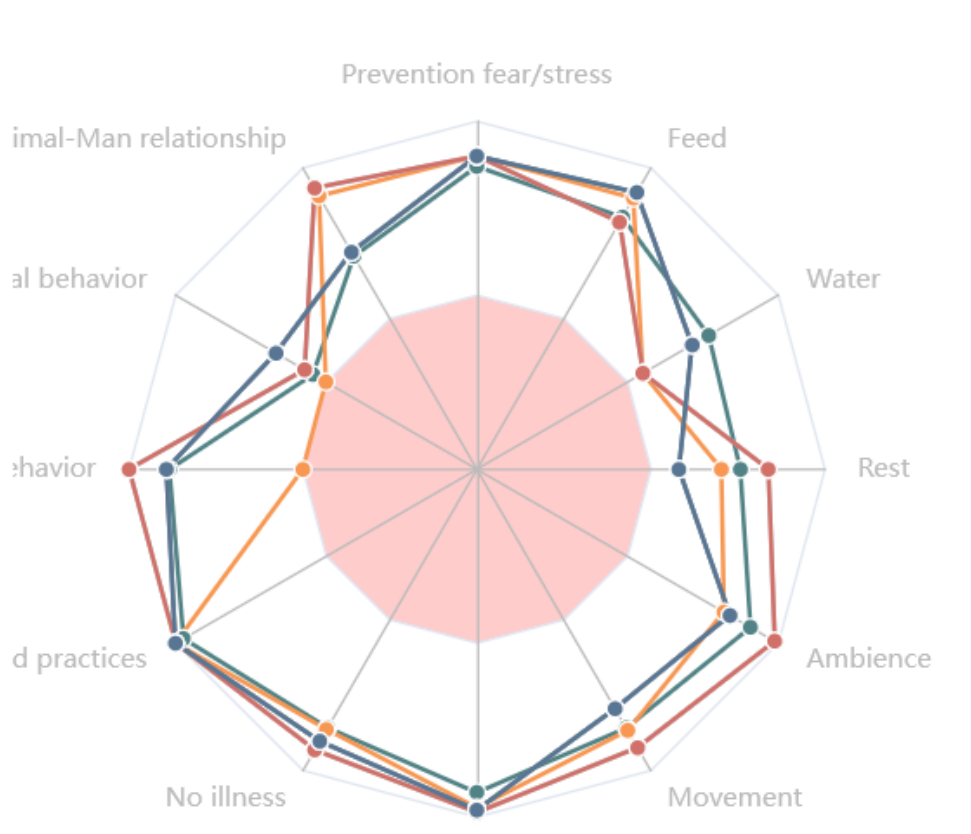


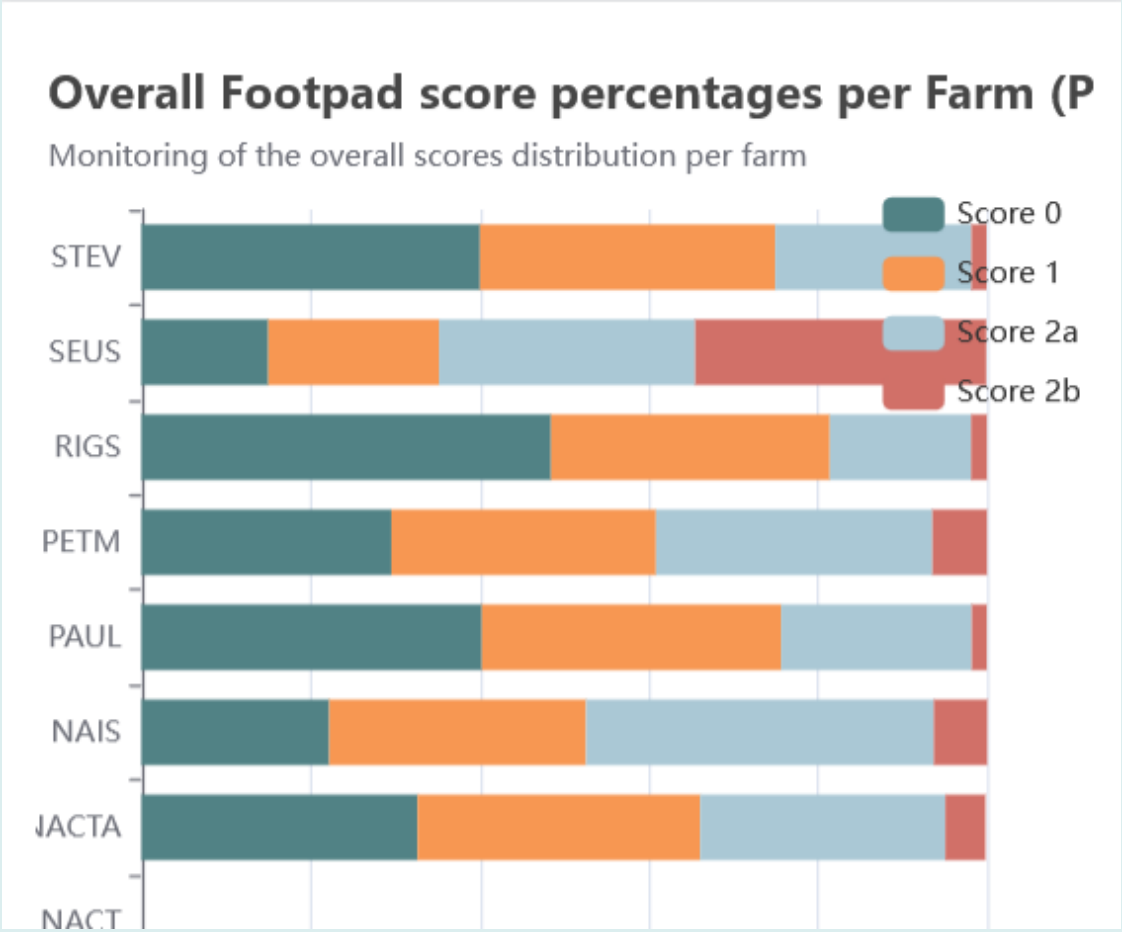
Farmers' Footpad General Score evolution over time (Farm BERP)

Monitoring of Footpads General Score on a weekly bases



Overview per farm / comparison between farms





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Conclusion

- Automatic assessment of FPD and hock burn is a valuable to collect (some) welfare data at slaughter
- The ChickenCheck system could be validated with human assessors
- Humans and system selected similar size areas affected by FPD and hock burn
- Offers perspective for practical broiler welfare assessment, especially when combined with other welfare data

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This project has received funding from the European Union's Horizpn Europe Research and Innovation Program under Grant Agreement No. 101060818

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