

# An ICT-based real-time advisory tool to minimise tail biting in fattening pigs



## Summary

### Algorithm optimization (WP2, KU Leuven)

- PIGdet benchmark dataset (50k+)
- Detection algorithm for densely housed condition
- 24/7 feeding and drinking behaviour monitoring

### Risk factors for tail biting(WP3, AU)

- Data collected

### Demonstration(WP4, Teagasc)

- The camera system installed over 30 pens at different stocking densities
- Seventeen tail biting incidents occurred

## Main objective

- Tail biting is a major welfare, economical and ethical challenge faced during pig production
- To develop monitoring tool and establish relationship between risk factors and tailbite outbreak

## Preliminary results

- Tailored pig detection algorithm: mAP=0.97 (outperform the SOTA YOLOv5 by 32%)
- Promising generalization capability in detection (mAP ~ 0.95 in new environment)
- Feeding duration monitoring: MAE=1.33 min/2h, RMSE=1.81 min/2h, R2=0.99
- Using only one frame per 10 sec resulted in similar performance, making it possible to monitor feeding behaviour in real-time

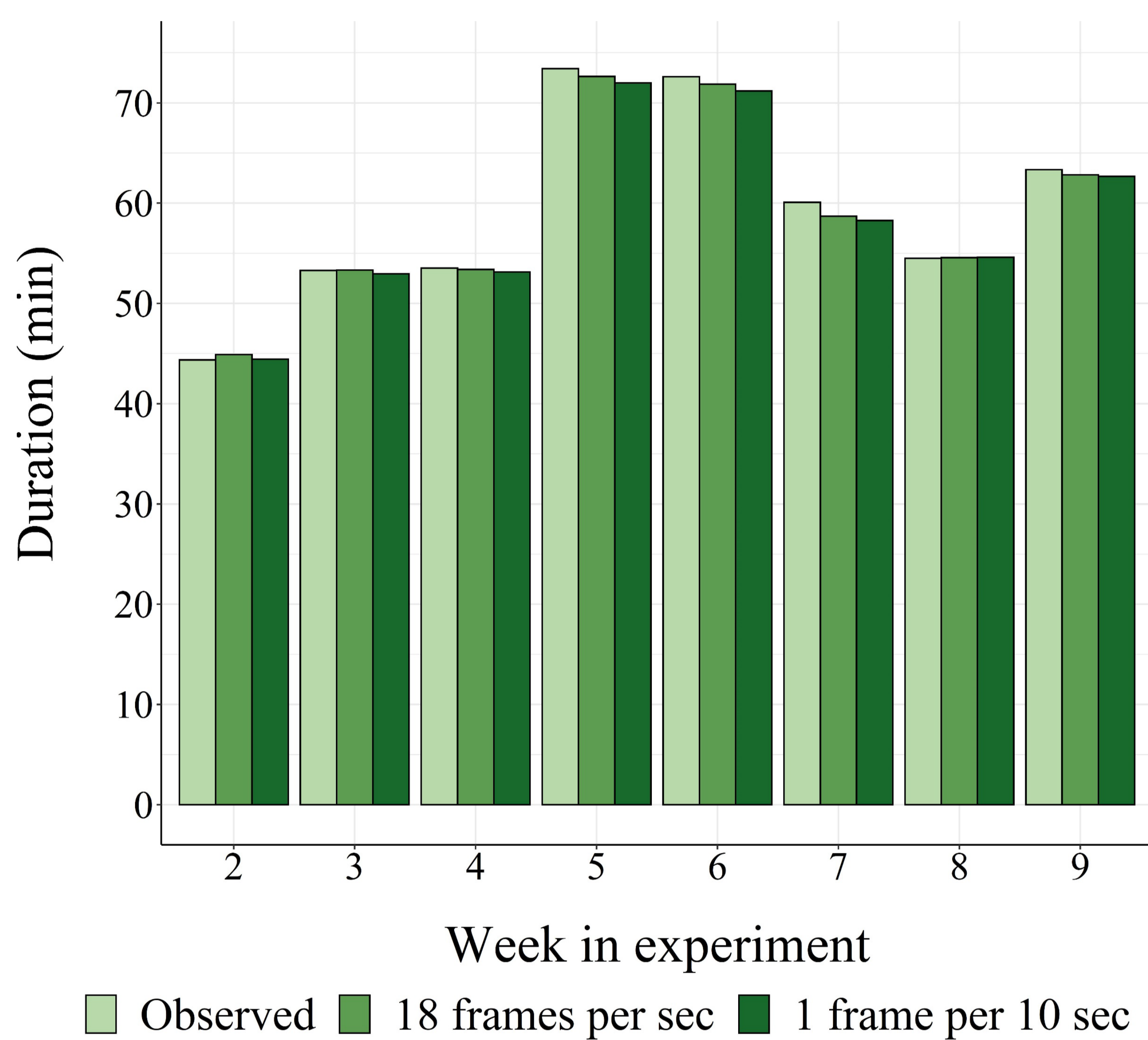


Fig. 1. Average duration of feeding per 2 h across three pens and three feeders per pen(left)

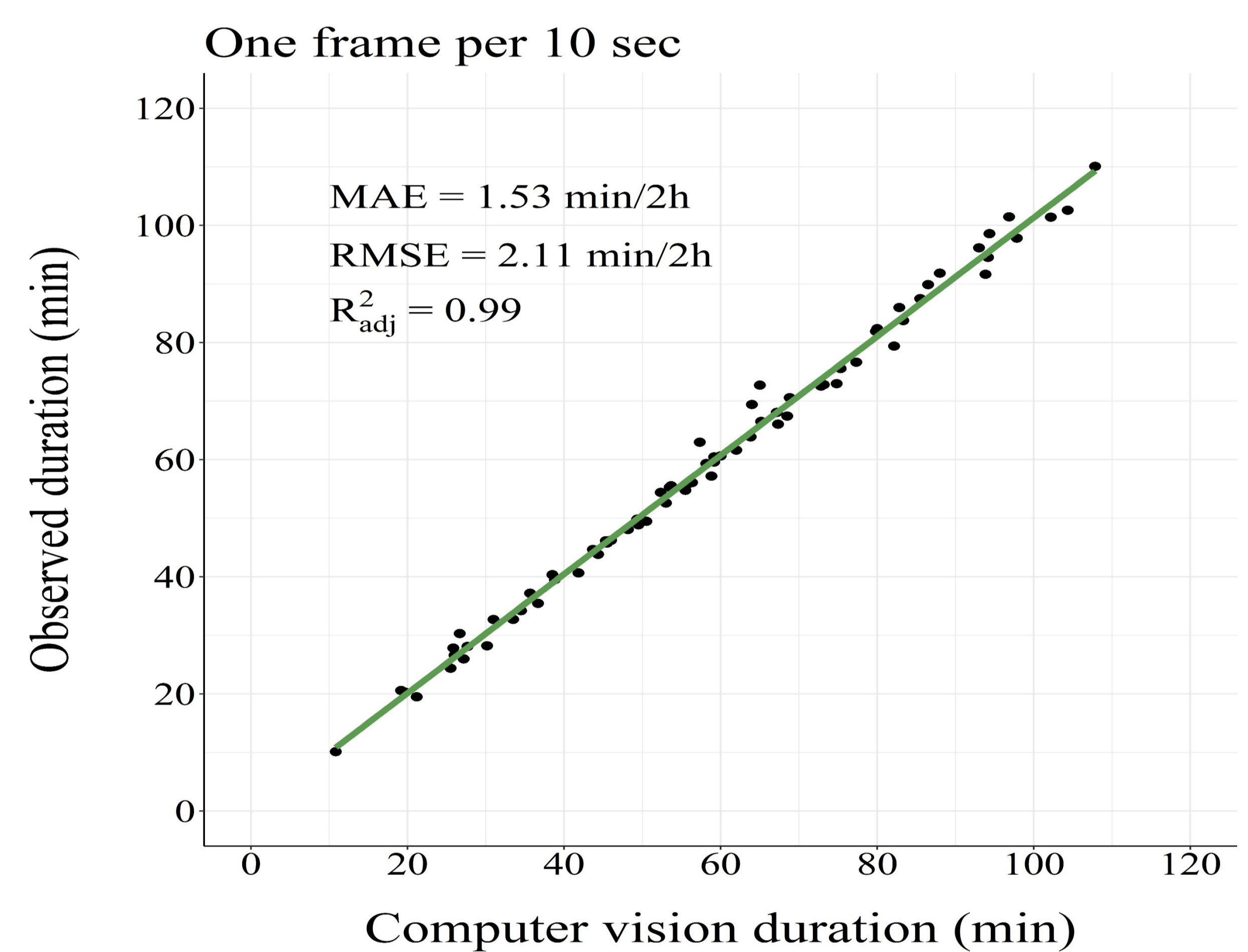


Fig. 2. Correlation coefficient between prediction and ground truth

## Preliminary conclusions/potential impact

- Challenge of monitoring pig behaviour in dense scenario was solved by our tailored detector
- Behavioural monitoring by nose-to-tail, nose-to-feeder, nose-to-drinker and nose-to-enrichment interactions as indicators to detect tail biting, feeding, drinking and enrichment engagement.
- Feeding example was demonstrated in Fig. 1 and Fig. 2.
- We can apply pose estimation and segmentation for coarse-to-fine application on top of our detector

## Future research activities

- Implement/validate nose-to-tail, nose-to-enrichment interactions as new behavioural indicators
- To make robust behaviour monitoring tool in farm-representative scenarios
- To establish the relationship between included parameters and risk factors of tail biting

