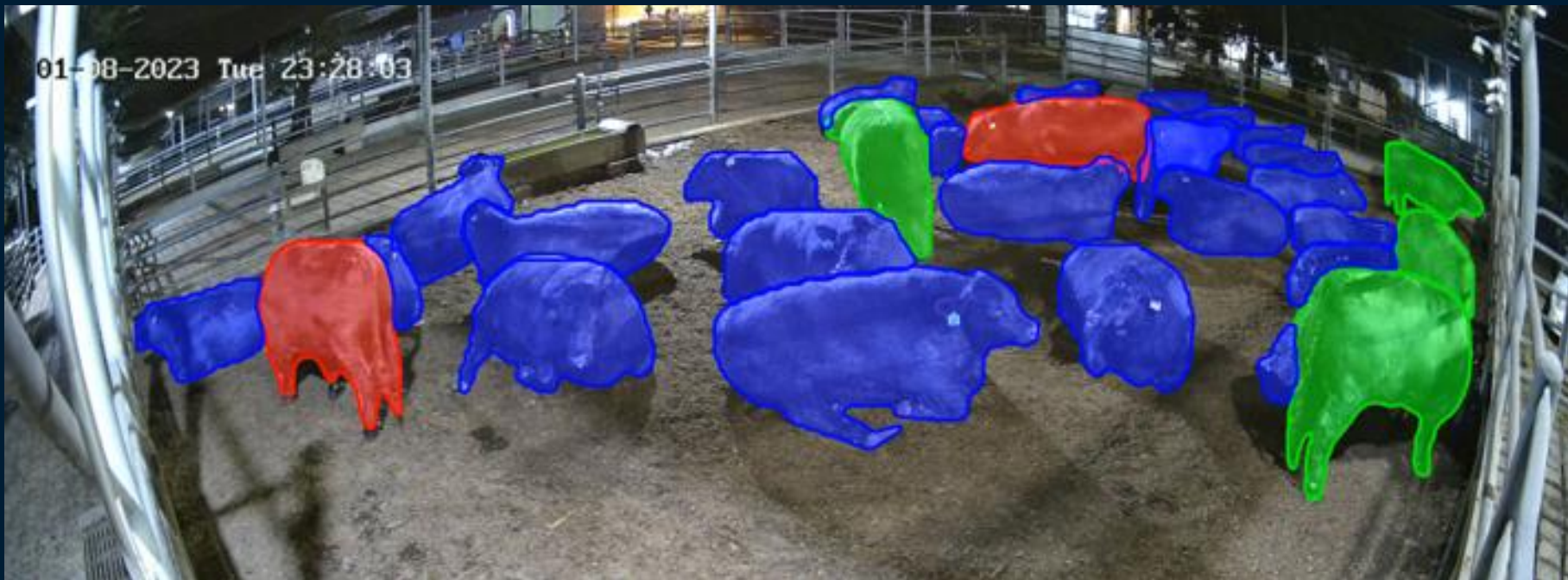
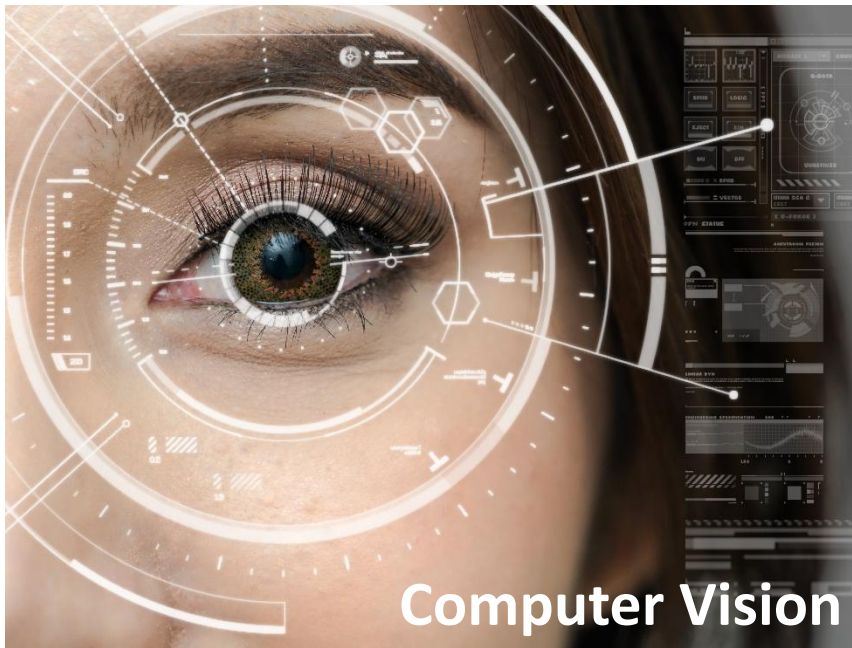


# Artificial intelligence in the abattoir to improve welfare outcomes



# Definitions



Computer Vision



Lairage



# Cattle in Lairage



‘Australian Livestock Processing Industry Animal Welfare Certification System’ - AAWCS



# Animal Welfare

Short, but critical time period in an animal's life

- Care for the animals
- Meat quality implications
- Economic consequences



18-07-2023 Tue 23:55:08

pen 120 Cam1 top left



# Applications of Computer Vision Monitoring

- Real-time alerts for personnel to intervene
- Longer-term assessment of management/husbandry changes for welfare improvement
- Regulatory/assurance compliance





# Mandatory CCTV from 2026

## Processors move to mandatory CCTV surveillance in abattoirs

Beef Central 30/01/2025



Media centre

### RSPCA welcomes inclusion of mandatory video surveillance in updated Animal Welfare Certification System

Today, the RSPCA commends the Australian Meat Industry Council (AMIC) for the inclusion of mandatory video surveillance into the updated Australian Livestock Processing Industry Animal Welfare Certification System (AAWCS) in red meat processing facilities.

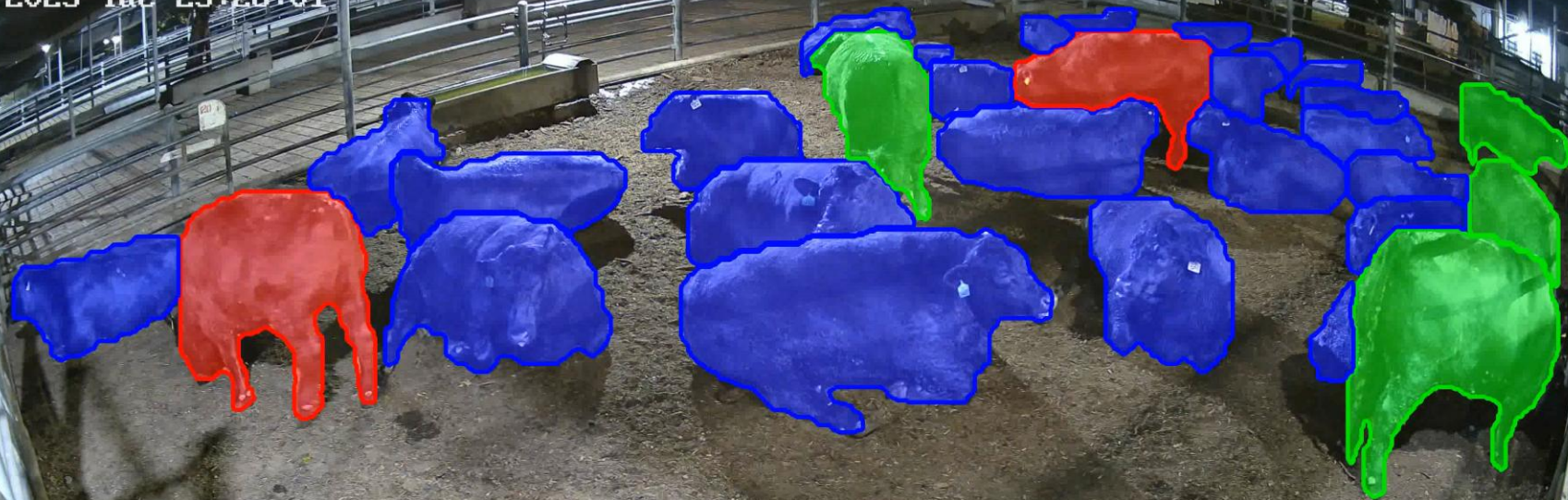


RSPCA Australia

Thursday, 30 January 2025

Subscribe to our media centre

01-08-2023 Tue 23:28:01



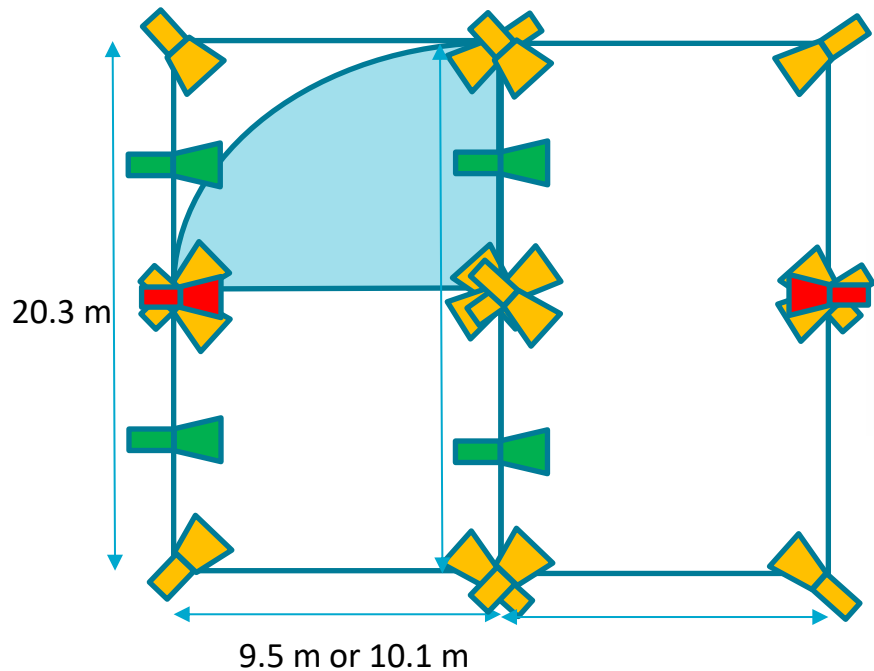
walking:	6.67%
standing:	13.33%
lying down:	80.00%

Count: 10

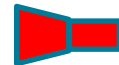
pen 120 Cam1 top left



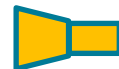
# Camera Installation in Two Lairage Pens



Water trough camera



Program controllable PTZ camera



Animal monitoring camera



# Posture and Movement Behaviour

02-10-2023 Mon 18:16:31



-  Walking
-  Standing
-  Lying

walking:	0.00%
standing:	89.66%
lying down:	10.34%

Count: 29

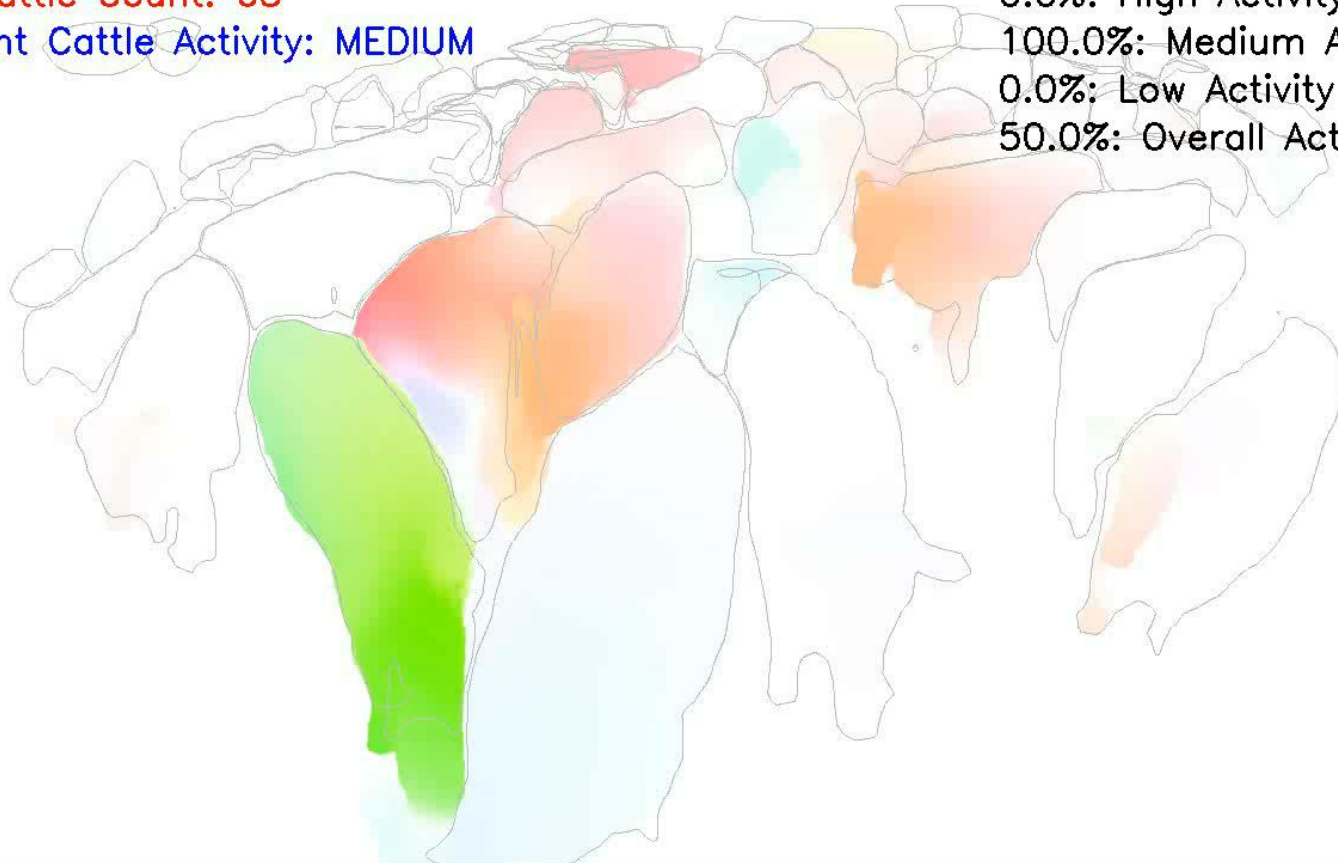
pen 120 Cam1 top left



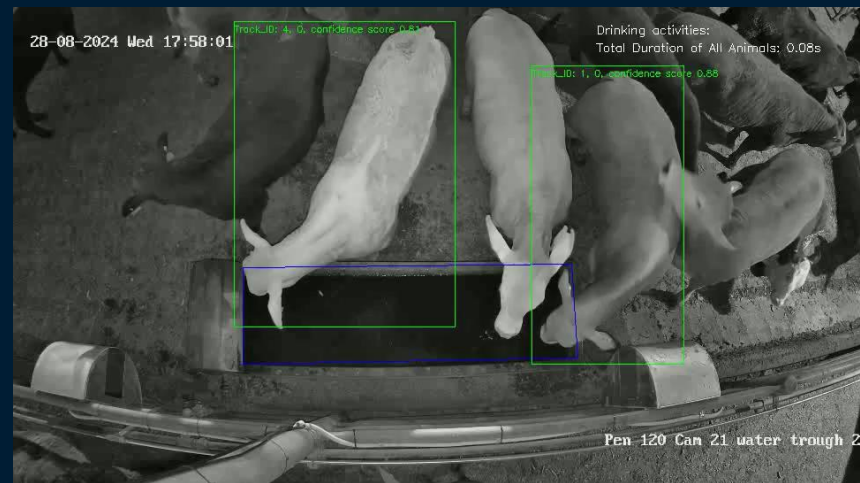
# Animal Activity Level Estimation

Avg Cattle Count: 63  
Present Cattle Activity: MEDIUM

0.0%: High Activity  
100.0%: Medium Activity  
0.0%: Low Activity  
50.0%: Overall Activity



# Drinking Behaviour



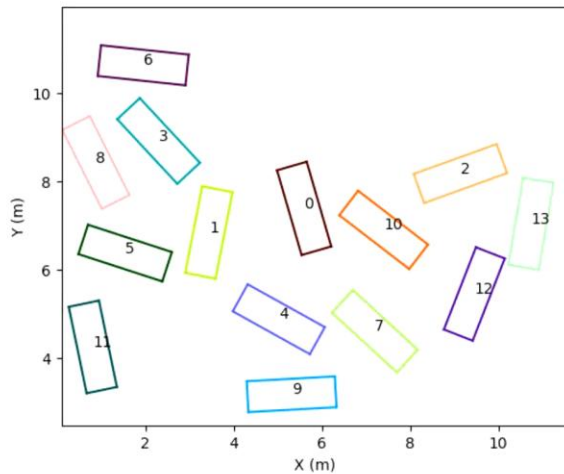


# Lameness and Eye Temperature





# 3D Multi-View Matching Based Cattle Movement



# Synthetic Data Creation - Digital Twins

Behaviour

Angle

Flooring

Illumination

**Weather**

Size

Species

Pose





# Applications

Behaviour	Welfare state	Standard	Management	Meat Quality
Lying	Comfort and recovery	AAWCS (stocking density)	Floor bedding, stocking density	Dark cutting
Drinking	Hydration	AAWCS (access to drinkable water)	Access, water quality	Dark cutting
Lameness	Pain and injury	Fit to load (MLA), Transport standard	Pre-transport preparation, remove animal	Downgrading
Activity	Social stress	AAWCS (mixing unfamiliar)	Remove bully	Dark cutting



# Lairage Research

- Lying is important for cattle
- Stocking density affects lying as well as substrate

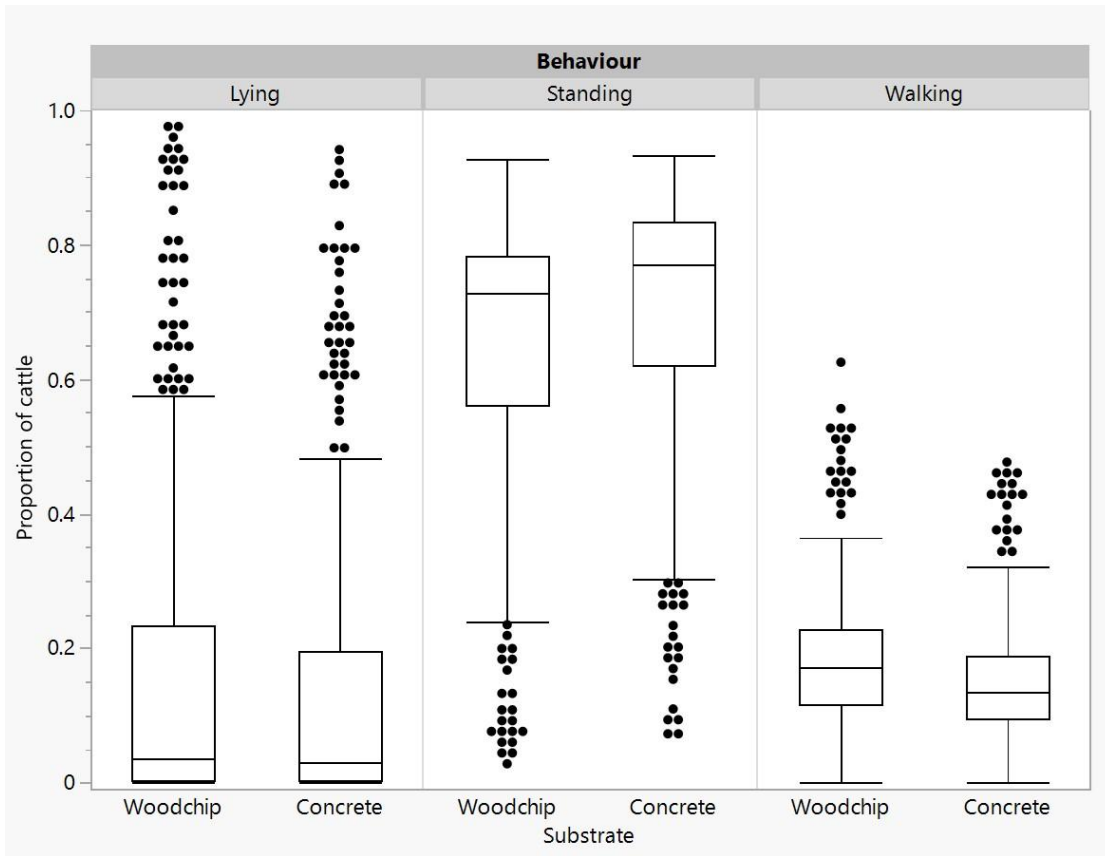


Cockram, M.S., 1990. Some factors influencing behaviour of cattle in a slaughterhouse lairage. *Anim. Sci.* 50, 475-481. doi:10.1017/S0003356100004955

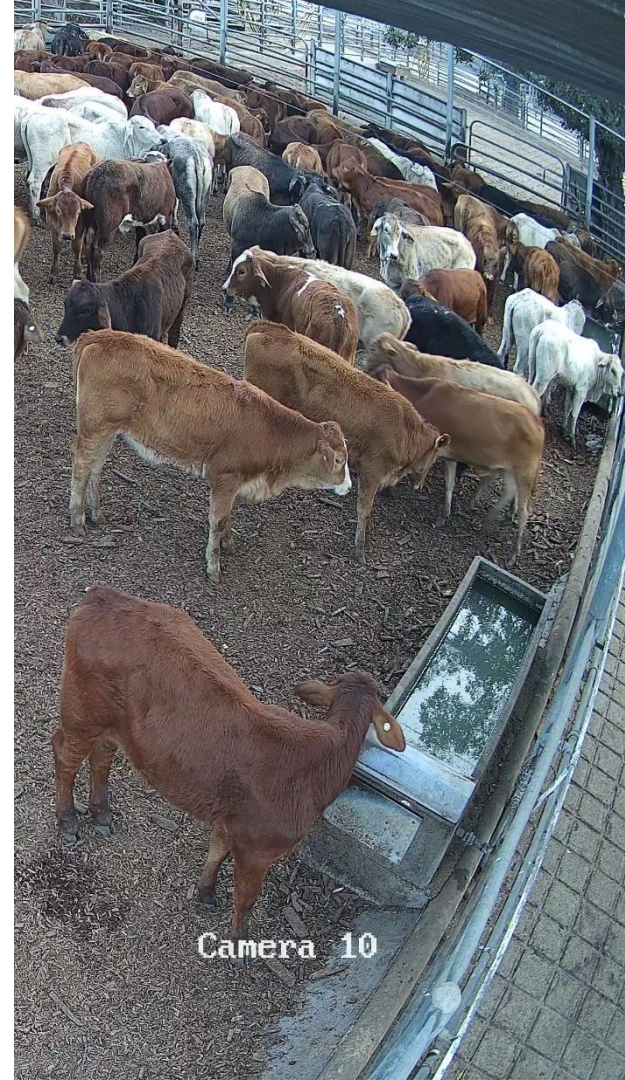
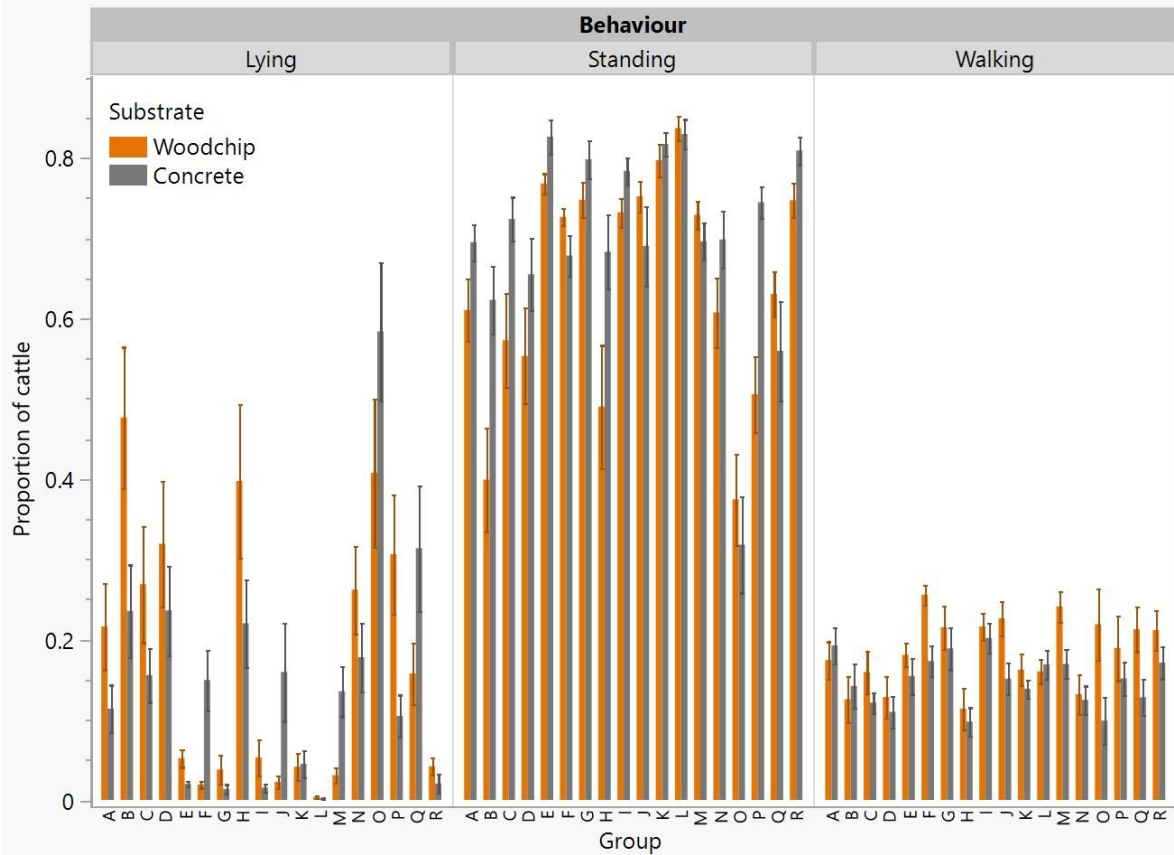
Cockram, M.S., 1991. Resting behaviour of cattle in a slaughterhouse lairage. *Br. Vet. J.* 147, 109-119. [https://doi.org/10.1016/0007-1935\(91\)90100-2](https://doi.org/10.1016/0007-1935(91)90100-2)

Tucker, C.B., Jensen, M.B., de Passillé, A.M., Hänninen, L., Rushen, J., 2021. Invited review: Lying time and the welfare of dairy cows. *J. Dairy Sci.* 104, 20–46. <https://doi.org/10.3168/jds.2019-18074>

# Floor Substrates



# Group Variability





# Where to from here?

- Interpreting automatically detected behaviours
- Setting thresholds
- Sending alerts
- When to intervene
- Incorporating other variables
- Relationship with meat quality





**Caroline Lee**  
Dana Campbell  
Troy Kalinowski  
Neil Bagnall

**Dadong Wang**  
Shenghong Li  
Qiyu Liao  
Rizwan Khokher  
Xin Yuan  
Stuart Anderson  
Jingyu Zhang  
Jiahao Ma  
Xinlong Guan



**Thank you to the  
commercial partner facility**

open 120 Can1 top left

**Supported by CSIRO AI4Missions Funding**