



THE UNIVERSITY of EDINBURGH
Royal (Dick) School of
Veterinary Studies



WELFARE CHALLENGES IN SMALL RUMINANTS

Michelle Reeves

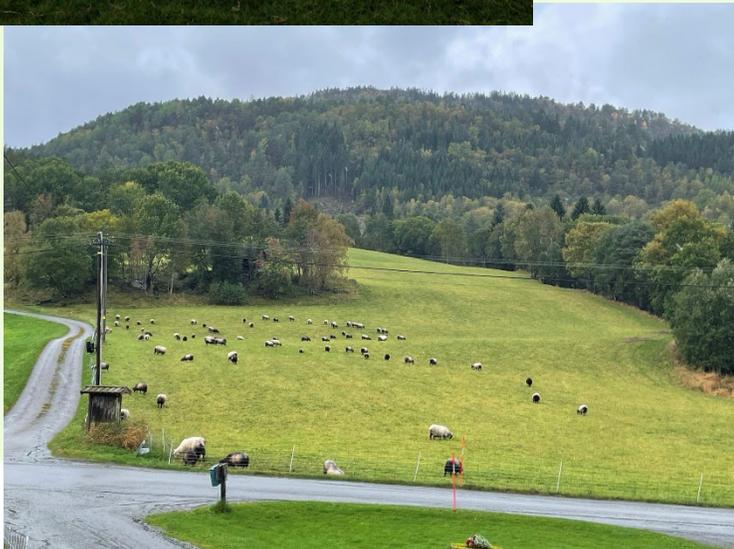
***EAAP 2024
Florence, Italy***

Leading the way in Agriculture and Rural Research, Education and Consulting

Unique systems = unique challenges



Lise Grøva



Lise Grøva

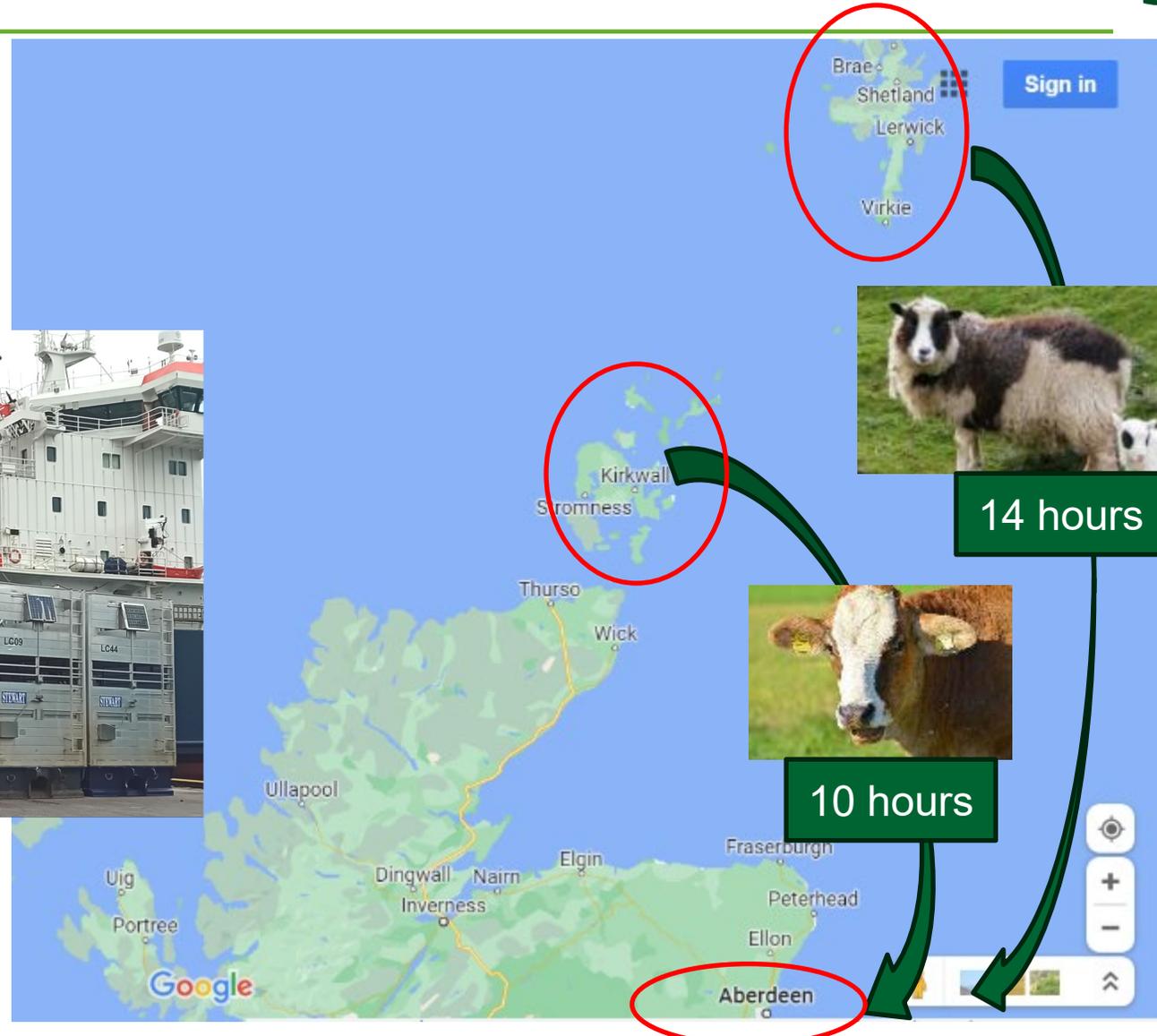
1 - Livestock transport from the Northern Isles: Heavenly cruise, hell-on-the-high-seas or something in the middle?



Malcolm Mitchell, Cathy Dwyer, Mhairi Jack, Alena Kadlecova, Jo Donbavand, Mark Brims, Simon Turner Simon.turner@sruc.ac.uk

Livestock transport from Orkney and Shetland

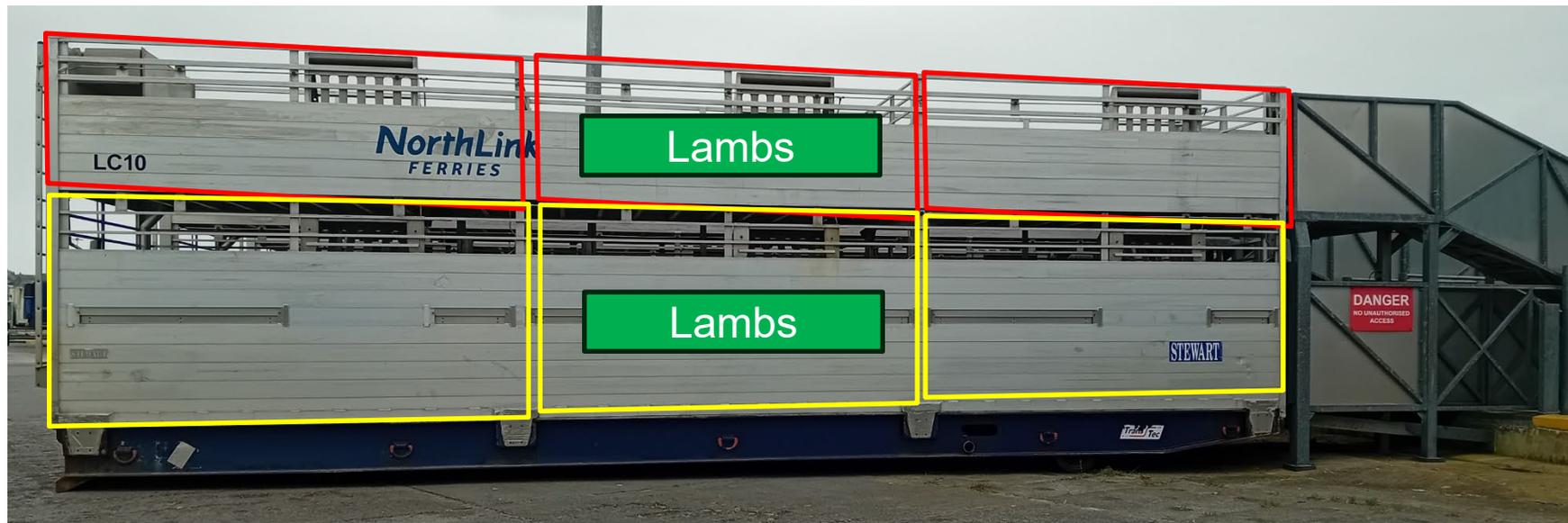
- 152,000 sheep per year



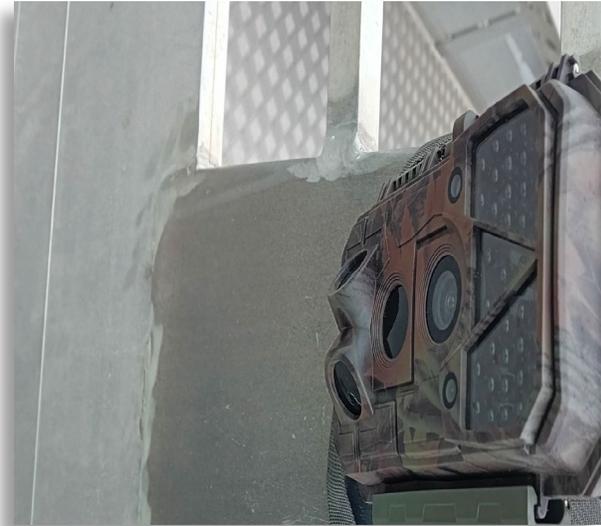
- Transported in unique livestock cassette (LC) system
 - Food, water and slurry removal



- Data were collected on 3 journeys from Orkney (store cattle) and 3 journeys from Shetland (lambs)
- 6 cassettes per journey
- Scale of project did not allow more classes of stock to be meaningfully sampled



Data recorded



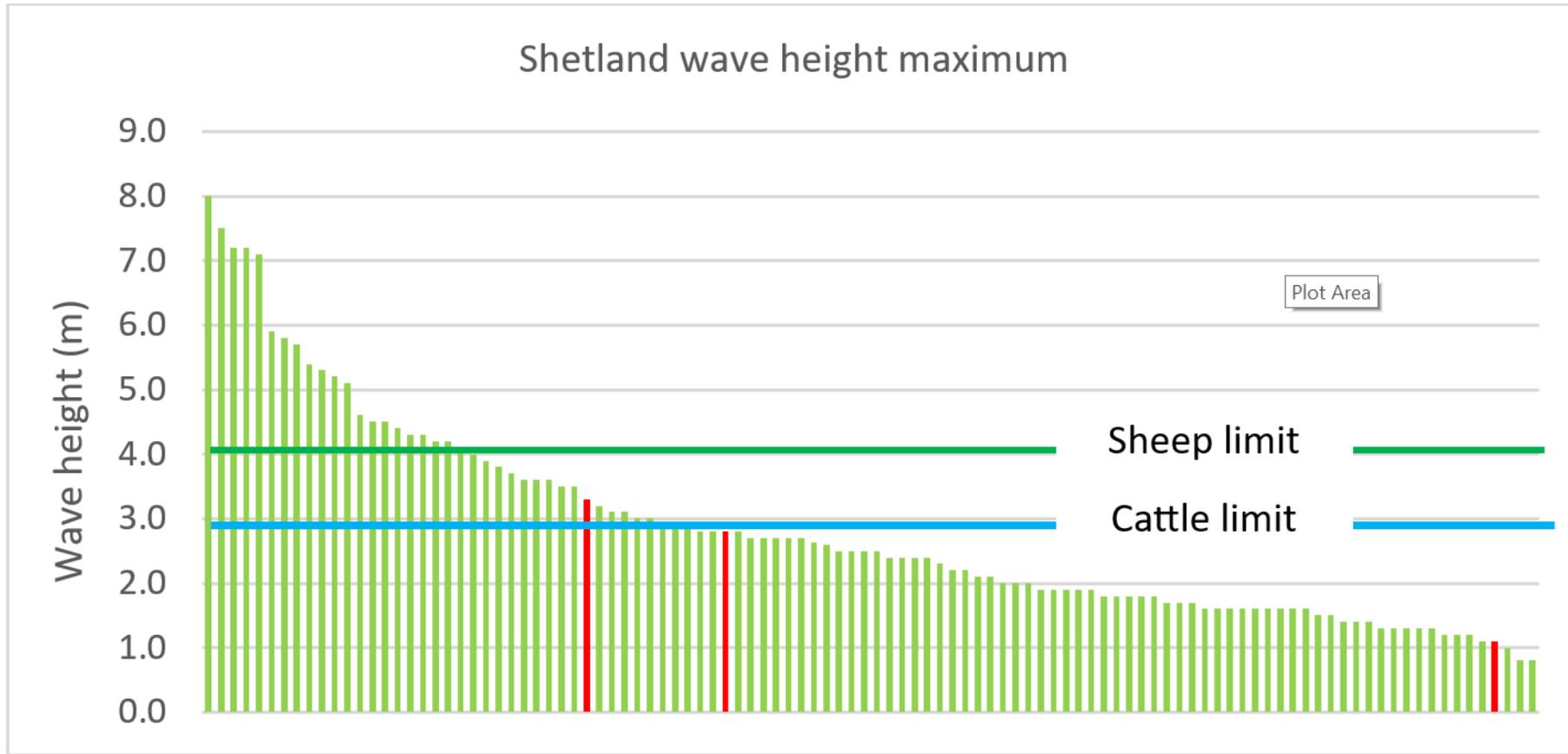
- **Animal behaviour**
 - 1 minute videos every 20 mins throughout sailing
- **Temperature every 5 mins**
 - inside lower middle compartment of 5 cassettes per journey
 - immediately outside one cassette per journey
 - at edge of load-space; around 5-10m from closest cassette
- **Humidity every 5 mins**
 - inside 1-2 cassettes per journey (lower middle compartment)

Data Recorded



- **Sound every second**
- **Motion**
 - Attached to cassette giving acceleration (g) in two horizontal and the vertical plane 4 times/second
 - Attached to a bulkhead approximately in the centre of the vessel giving acceleration (g) plus roll and pitch (10 times per second)

Wave Height did not exceed sheep limit

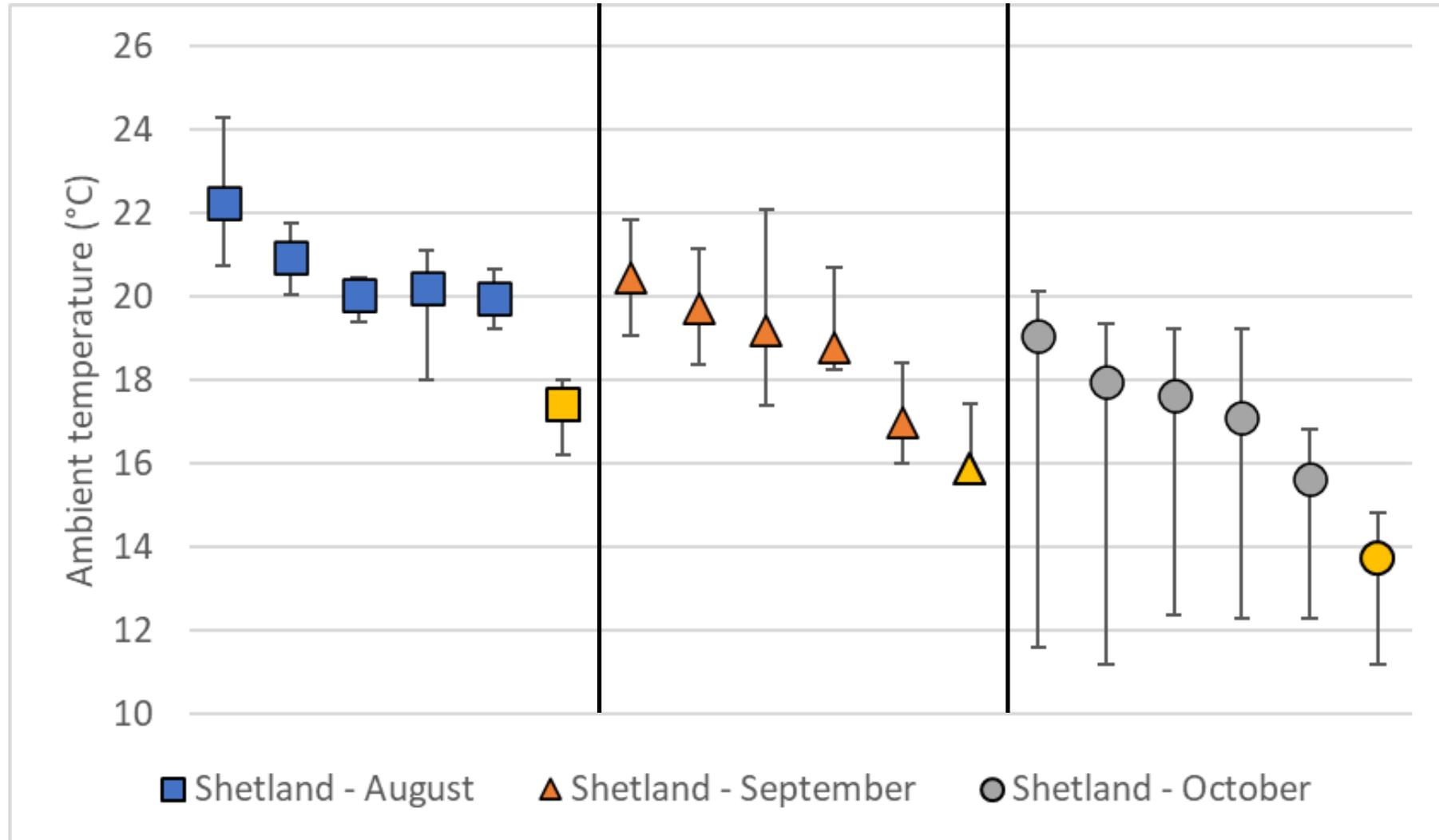


All hay consumed within 3 hours

- Hay was provided from entry to the cassette
- **Lambs:** Hay consumed within 3h and 4min after entry to cassette (16h 36min before docking in Aberdeen)



Temperature inside cassette exceeds outdoor temperature



2 - Evaluation of a novel method of lamb castration and tail docking



Animal - science proceedings

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Part of special issue

10th International Sheep Veterinary Congress (ISVC 2023)

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Department for Environment Food & Rural Affairs

O-126 Evaluation of a novel method of lamb castration and tail docking in reducing behavioural pain responses in lambs aged <1 week or 5-6 weeks

C. Dwyer ^a  , J. Donbavand ^a, M. Weston ^b, J. Kent ^b, V. Molony ^b

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Castration and tail docking



- Both cause significant pain
- Investigation into the efficacy of a new device: the ClipFitter

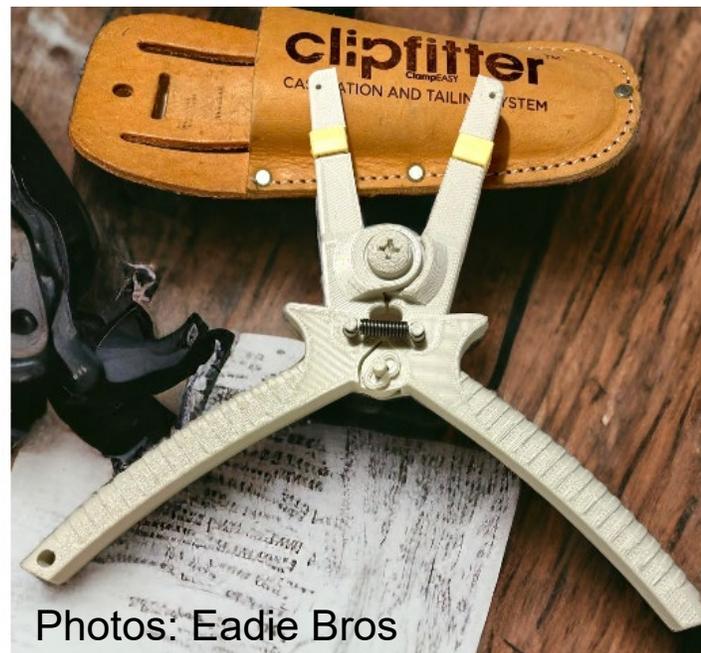


Figure 2



Data collection

- Two age groups: Young lambs (<7 days) & older lambs (5-6 weeks)
- Quantitative data for acute pain behaviours were collected for 60 minutes after treatment.
- Qualitative data (QBA) collected from 2 minute video segments.



ClipFitter reduced castration pain behaviour in young lambs

- **Castration in Young lambs:**
 - Castration with ClipFitter led to a reduced expression of pain behaviours compared to rubber ring (RR) with and without anaesthetic and NSAID ($P < 0.001$)
 - Pain behaviours from Castration with ClipFitter did not differ from the control group
 - No difference between tail docking with ClipFitter and with RR with anaesthetic and NSAID
 - QBA: RR castration led to more negatively valenced responses than ClipFitter or control.



Photos: Eadie Bros



Older lambs

- ClipFitter castration: higher pain behaviour frequency than RR castration with anaesthetic and NSAID and controls ($P=0.002$).
- Tail docking with ClipFitter did not differ from RR tail docking with anaesthetic and NSAID but both had higher pain behaviour frequency than controls ($P=0.012$).
- QBA: ClipFitter castration related to more negatively valenced states than RR with anaesthetic and NSAID or controls ($P = 0.032$).



Conclusions and Implications

- ClipFitter was able to mitigate pain responses associated with castration in **young lambs** to a level indistinguishable from uncastrated lambs.
- and tail docking responses similar to those achieved with use of local anaesthetic in **both young and older lambs**
- Although pain responses of older lambs castrated with ClipFitter were greater than controls, they were lower than has been seen with RR alone.



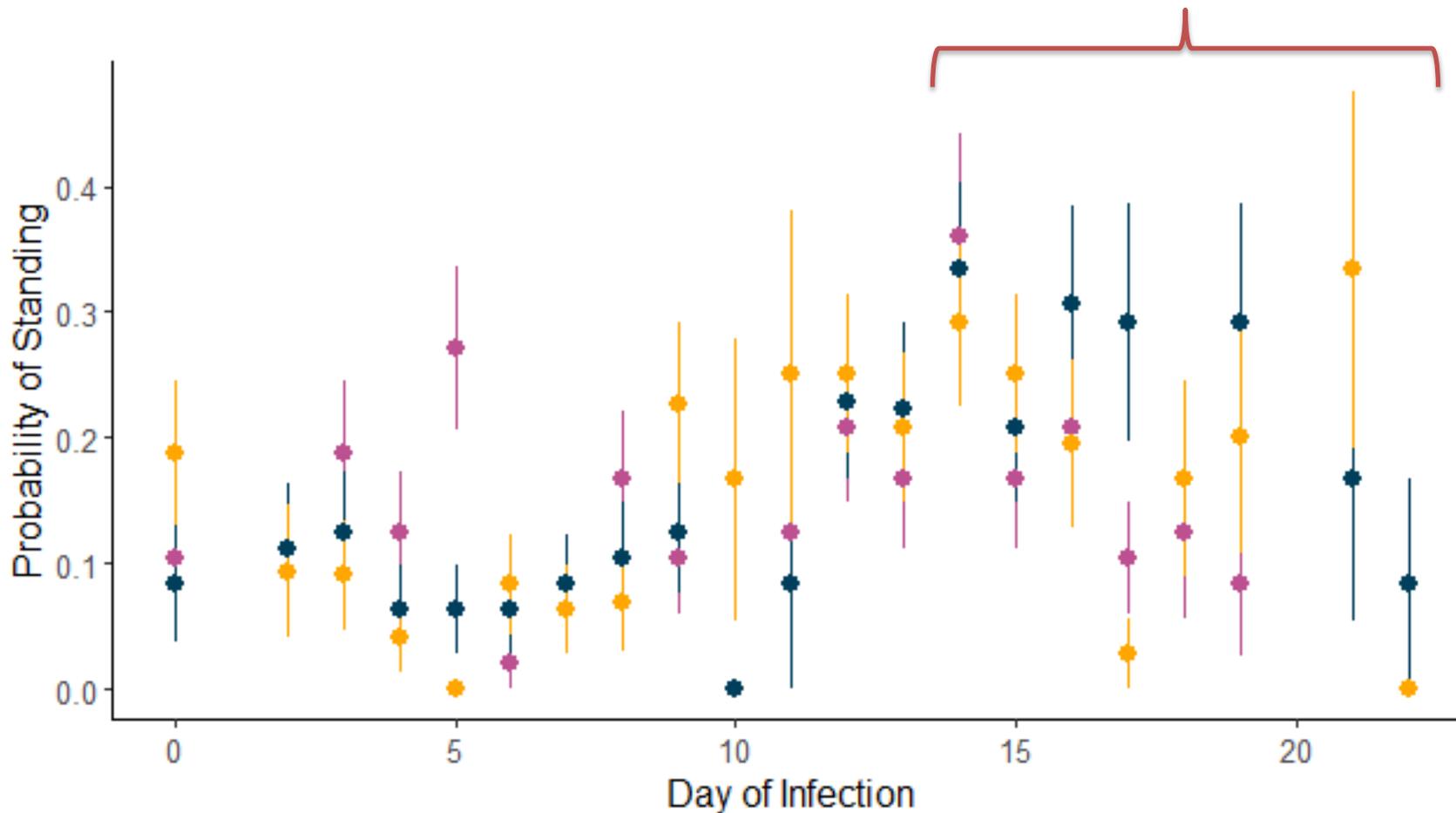
3 - Behavioural Indicators of Gastrointestinal Parasitism in Sheep

	Indoor	Outdoor
Lamb age @ 1 st observation	8 weeks	7 days
Infection type	Controlled, Sub-clinical <i>T.circumcincta</i>	Natural, <i>Nematodirus</i> and strongyle
Behavioural observations	Video recordings	In person



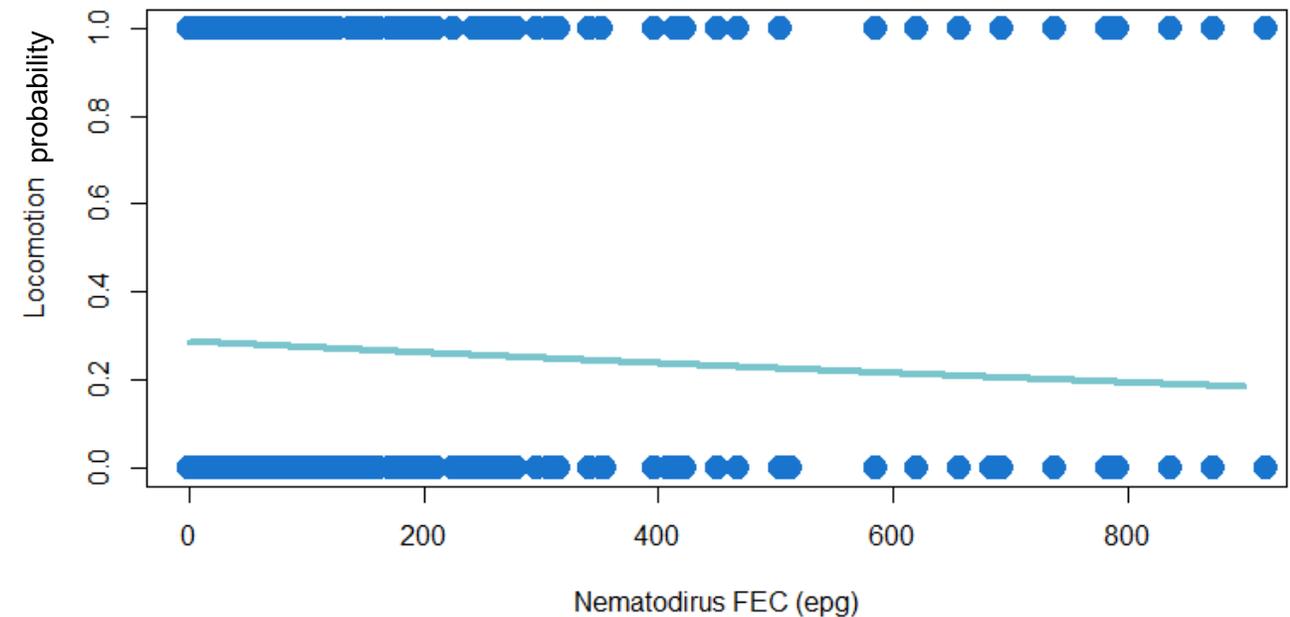
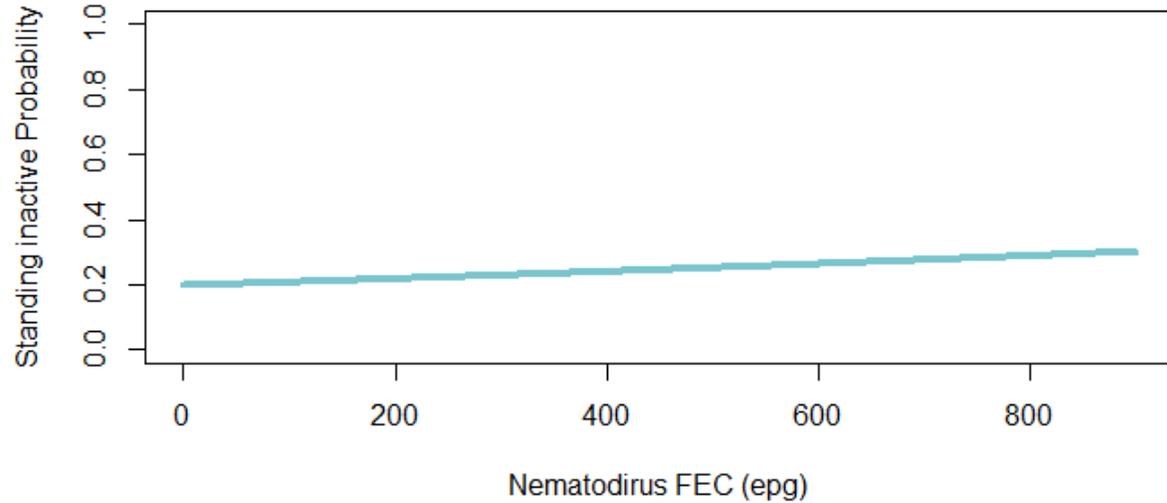
Indoors – Parasitised lambs were more likely to be standing

Ad-lib fed control Restricted fed control Ad-lib fed Parasitised



Especially from Day 14 onwards, **Parasitised lambs** more likely to stand

Outdoors – Parasitised lambs more like to stand



5-



animal

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Development of a novel Bluetooth Low Energy device for proximity and location monitoring in grazing sheep

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Photo: Aimee Walker

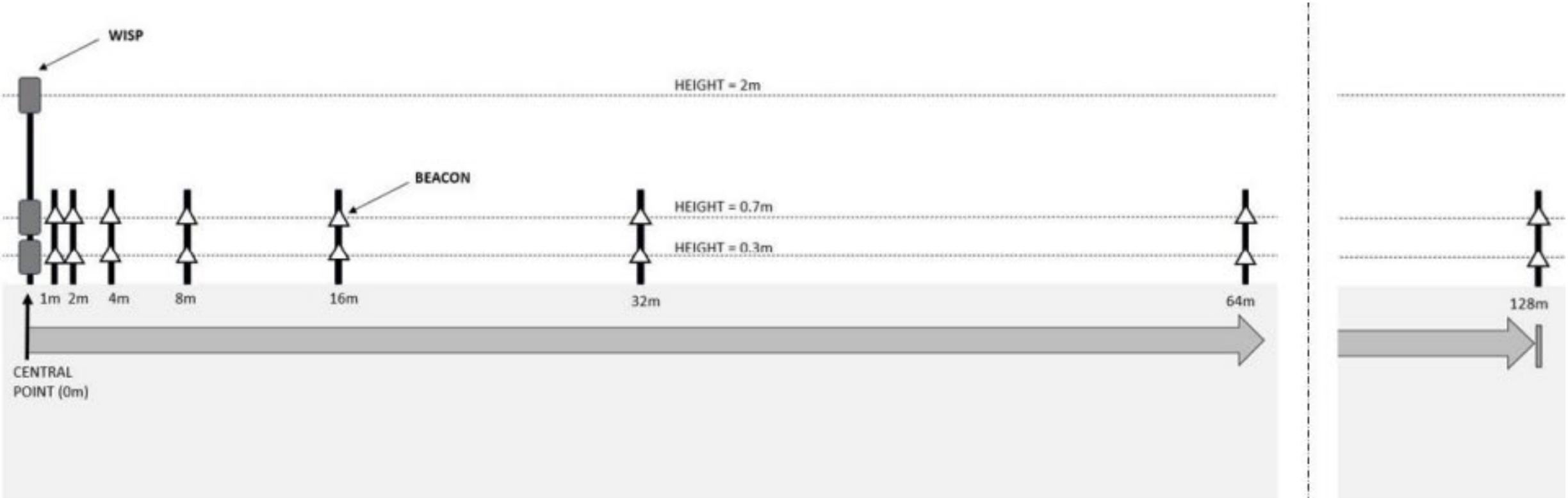
Validation and calibration of beacons



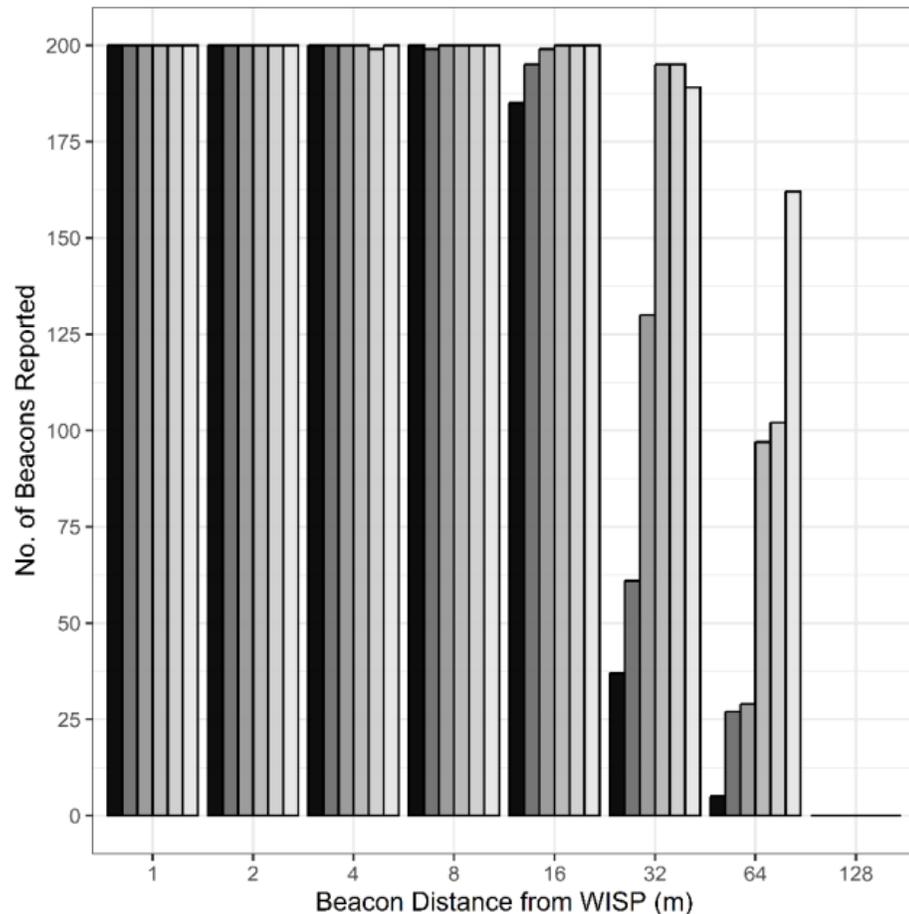
SRUC



Moredun
Research Institute



Beacons reported reduced with distance



- Distances ranged from 1.93m to 97.77 m,

- Readings reported for 86% of WISP-beacon pairings <63 m apart,

- Only 31% of readings reported for WISP-beacon pairings > 63 m apart.



Distance prediction validated with Global navigation satellite system (GNSS)

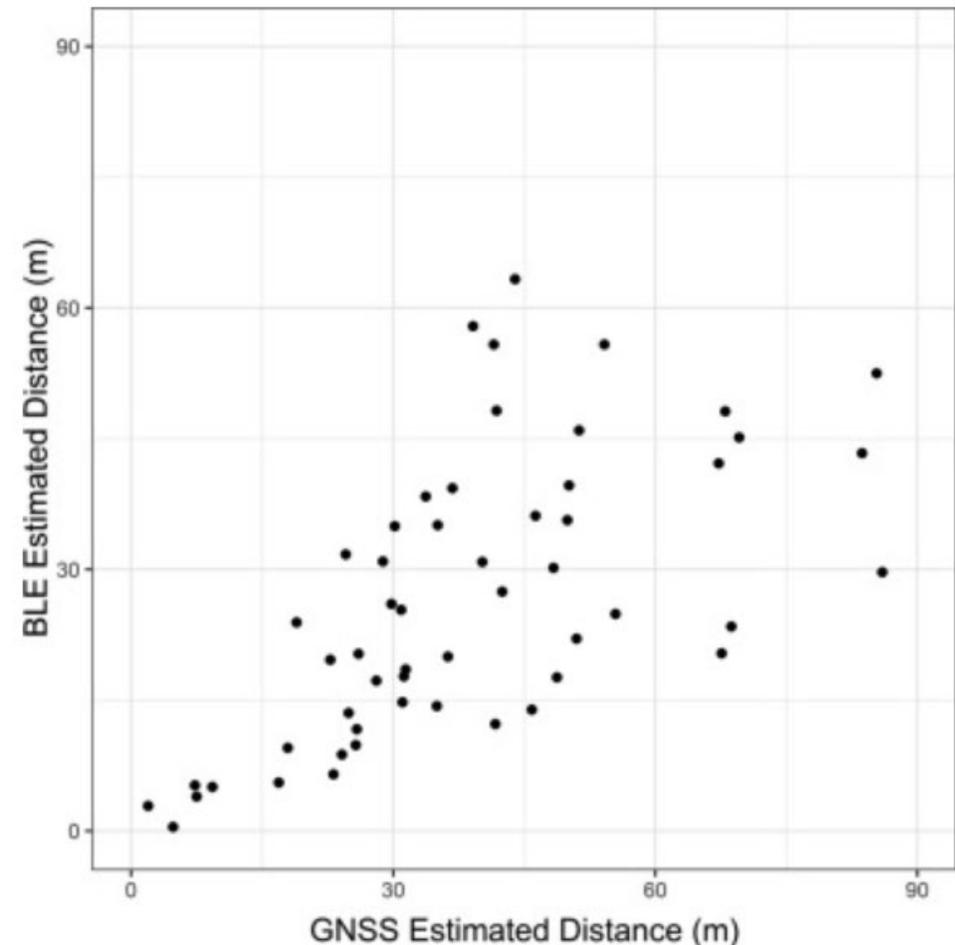


Mean underestimation of 12.13 m (SD = 15.97) by the prediction equation in comparison with the GNSS values

Underestimation: 1.59 m (SD = 18.52) for on-sheep trial.

39% of estimations within 10 m of the GNSS distance, and 76% within 20 m.

The largest differences between GNSS and BLE distance estimations occurred at distances over 64 m.



BLE beacon study conclusions



- the functional BLE range will be influenced by animal behaviour and posture.
- Not yet practical for commercial applications given the range and number of readers (WISPs)
- Demonstrated that the application of BLE as fixed readers for animal monitoring and localisation is possible.



6 - Using BLE beacons to measure potential ewe-lamb welfare indicators



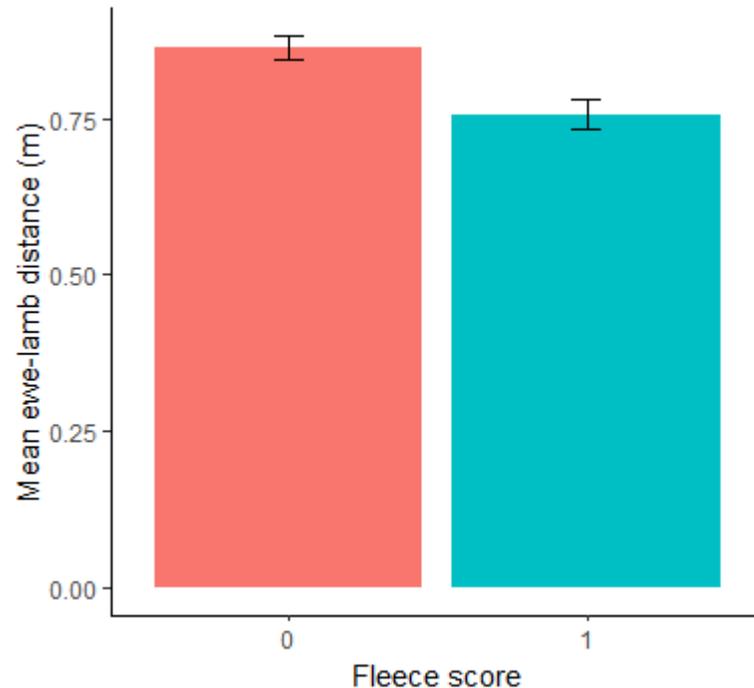
Photo: Aimee Walker

- Ewe-lamb relationship for lamb survival
- Ewe-lamb distance measured for Maternal Behaviour Score
- Can ewe-lamb distance be used as a welfare indicator when measured by Bluetooth beacons?

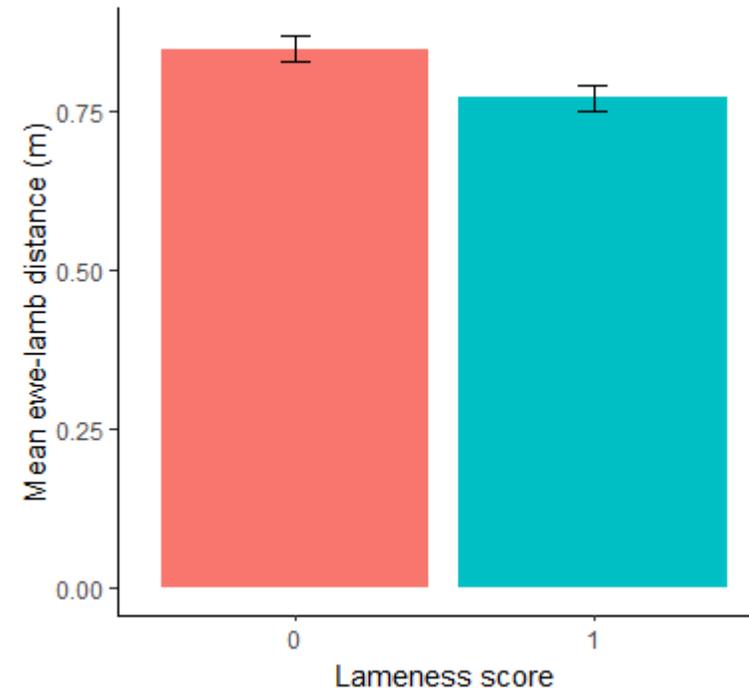
Ewes with welfare issues were closer to their lambs



Ewes with no fleece problems had a higher mean ewe-lamb distance than ewes with fleece problems ($P < 0.001$).



Sound ewes had a higher mean ewe-lamb distance than lame ewes ($P < 0.001$).



7 – Environmental impact of sheep welfare



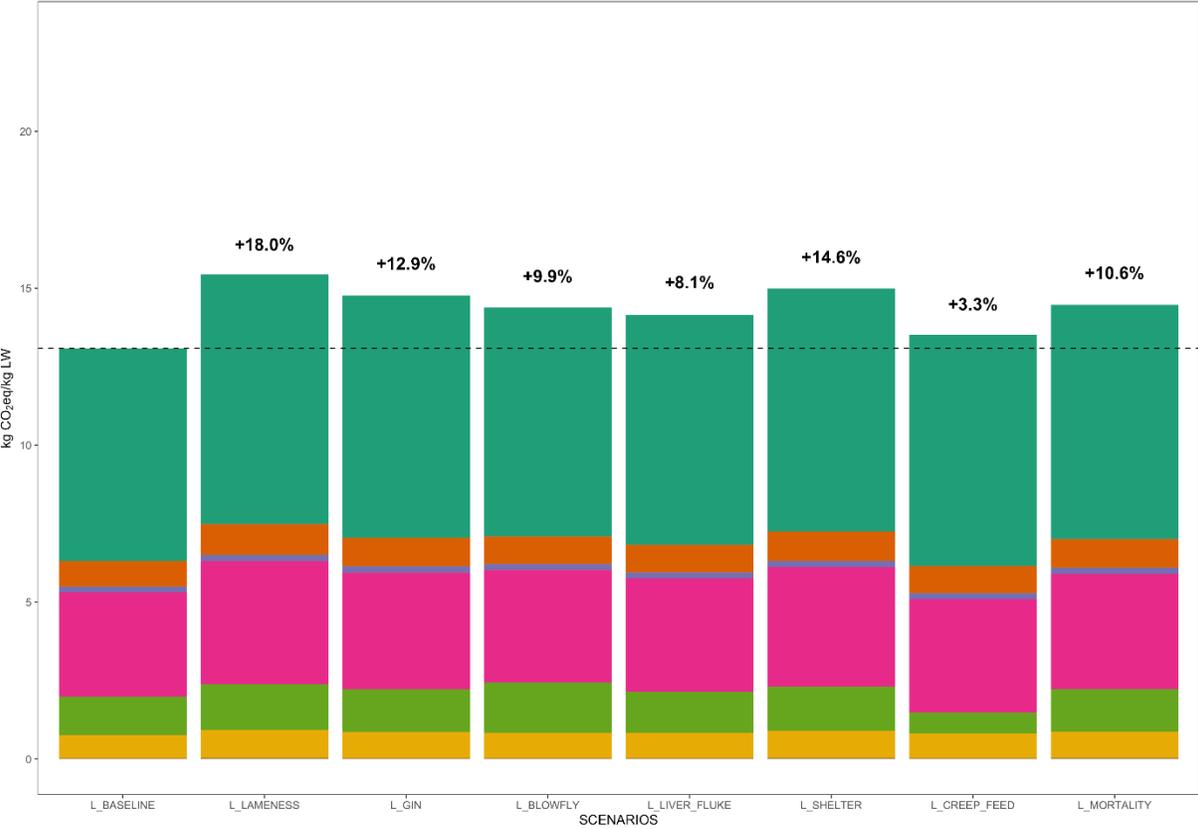
- Lydia Lanzoni, Michelle Reeves, Kaia Waxenberg, Rachel Ramsey, Alberto Atzori, Julian Bell, Bob Rees, Giorgio Vignola, Cathy Dwyer



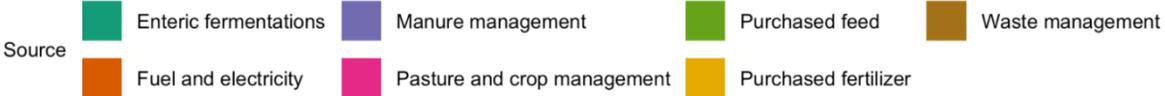
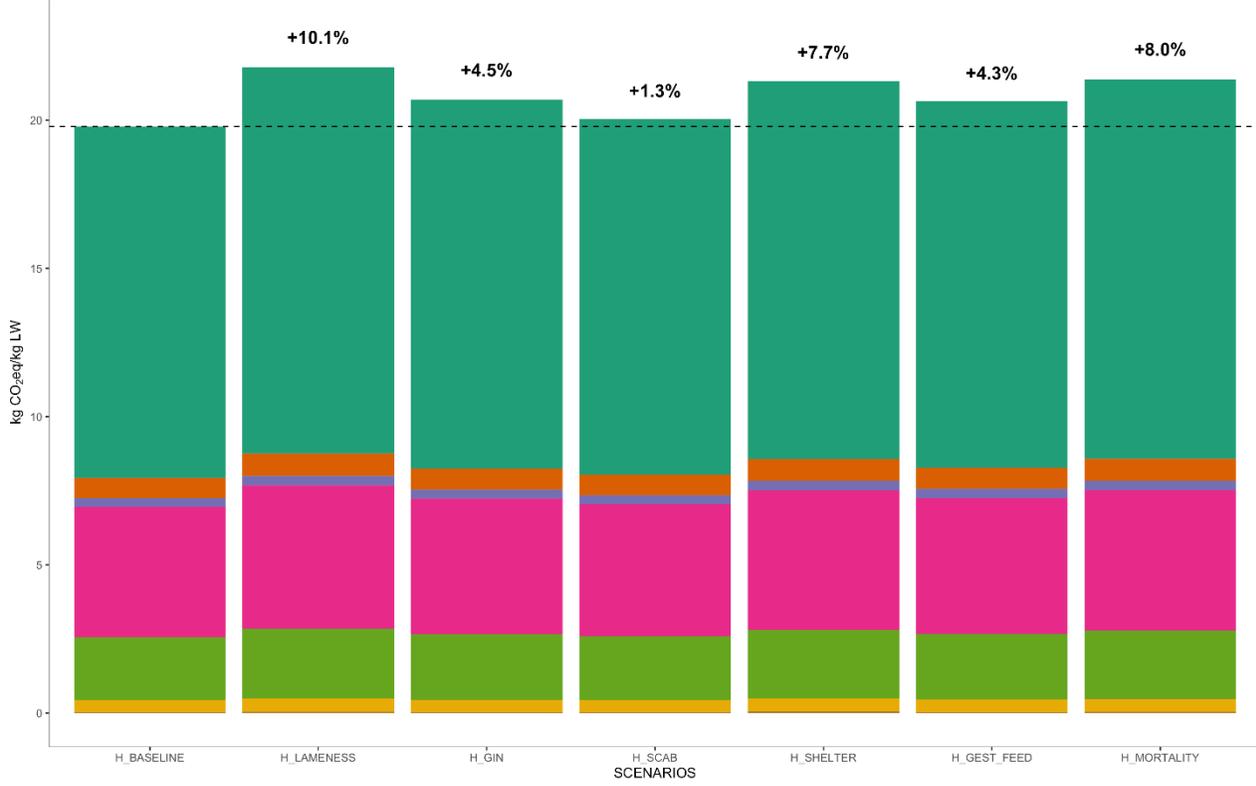
Lameness, parasites and lack of shelter can increase CO₂ emissions



- Lowland



- Hill



Thank you!

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