Evaluating a novel in-home cage monitoring system for tracking welfare during birth-giving events and post-surgery recovery

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Introduction

How do you ensure optimal animal welfare check-ups?

Lundbeck is collaborating with TrackPaw Scientific to develop and evaluate a novel in-home cage system that utilizes machine learning, RFID tracking and sensor technology to map individual animal health. The combination creates a first-in-class system that can characterize individual activity and weight changes in group housed animals.

In this joint effort, Lundbeck leveraged two instances where rigorous manual monitoring is required today and evaluated whether the TrackPaw system holds potential to monitor the animals in a more hands-free way with animal welfare in centrum.

Why track individual mouse health in their home environment?

To ensure a stress-free way of welfare monitoring, as mice often mask their actual behaviors during human intervention and environmental changes.

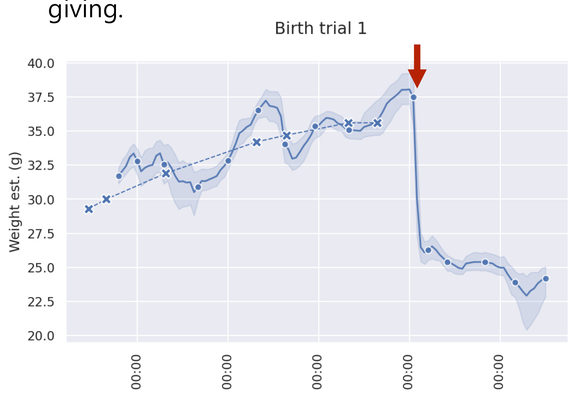
To gather vital digital biomarkers such as individual weight progression and activity changes.

To receive critical intervention time points (alarm).

To increase objectivity and reproducibility in research observations.

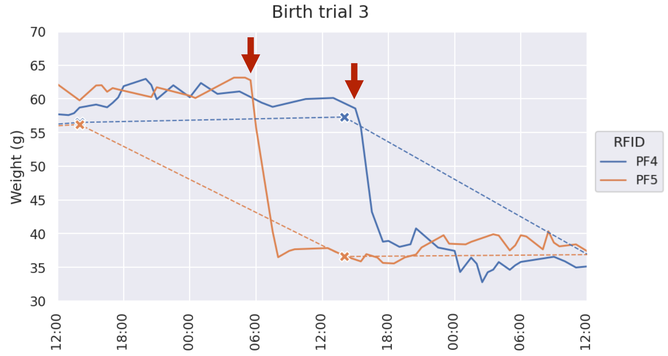
Late gestation and delivery tracking to pin-point time of birth

A total of **five pregnant females (PF)** were monitored for both weight and activity changes close to their delivery date. The dotted line show manual weight captures, while the solid lines show the TrackPaw system weight measurements, which is based on many opportunistic estimates. The system efficiently captured the significant weight drop (marked with arrows), indicating time points for birth-giving.



Weight progression over time. Estimated delivery of pups for PF1 was at 0130 AM.

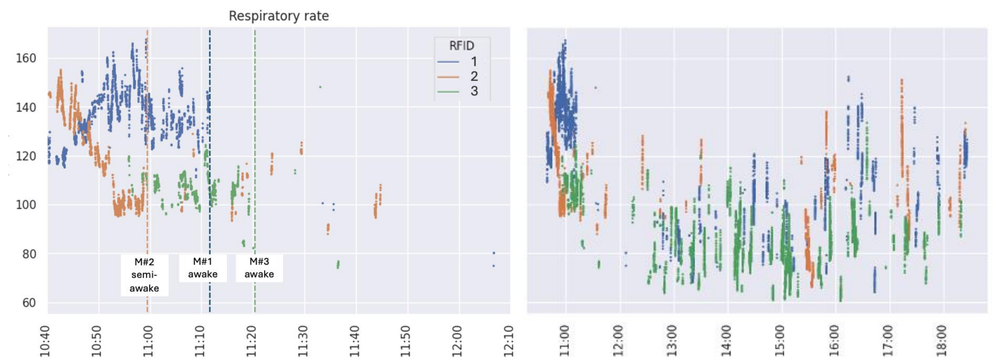
Estimated delivery of pups for PF2 – 12:00 PM, and 6:00 AM for PF3.



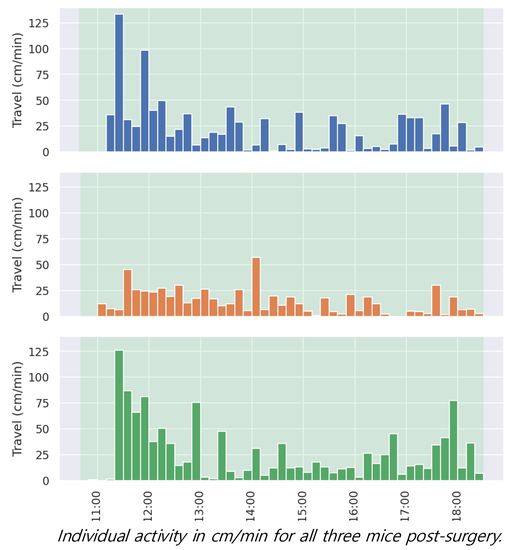
A zoomed in plot for PF4 and PF5. Estimated delivery of pups for PF4 – 3:30 PM, and 6:00 AM for PF5.

Post-op recovery monitoring - Respiratory activity and movement

Three mice were tracked for 7 hours after brain implant surgery. The TrackPaw system could efficiently map respiratory activity in animals not moving and determine anesthesia/wake cycles to evaluate recovery. When the mice were actively moving, their activity (cm/min) was tracked instead.



Respiratory activity right after surgery (to the left), and respiratory activity during several hours (to the left).



Individual activity in cm/min for all three mice post-surgery.

Conclusions

The TrackPaw system is a promising new tool for monitoring the health of mice in their home environment. The system allows for stress-free oversight, which is particularly useful in situations where rigorous monitoring is required, and handling should be kept at a minimum e.g. during recovery after surgery and in relation to giving birth.

What would YOU like to monitor in a hands-free way?