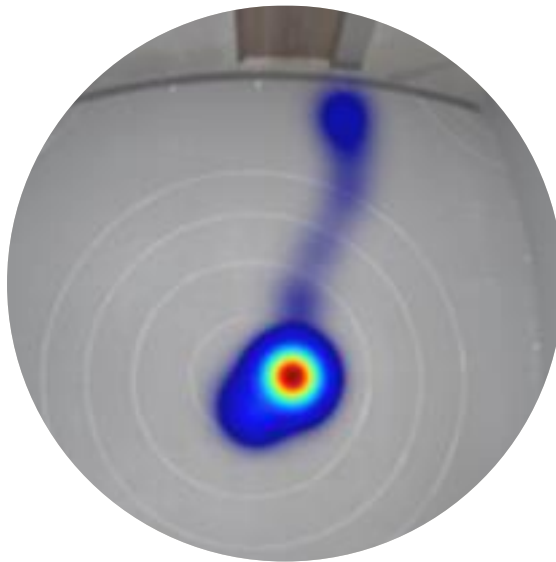


Automatic tracking to inform animal breeding and improve health and welfare

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WAGENINGEN UNIVERSITY
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Utrecht University

The challenge



- Identity
- Behaviour
- Health
- Social interactions
- Resilience

Breed4Food

- Consortium of four major breeding companies and Wageningen University & Research (<http://breed4food.com/>)

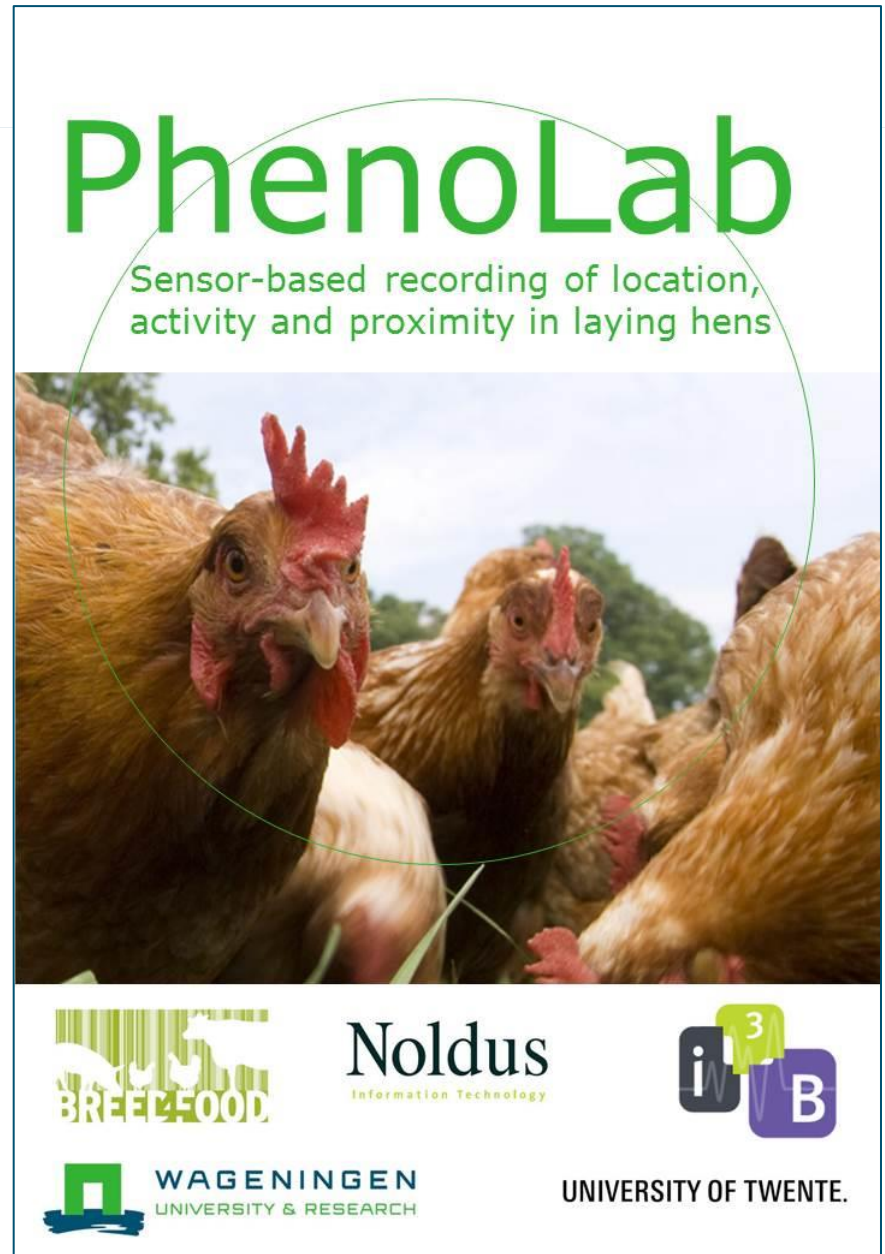
- Cobb-Europe
- CRV
- Hendrix Genetics
- TopigsNorsvin



- Research topic: Precision Phenotyping (in all species)

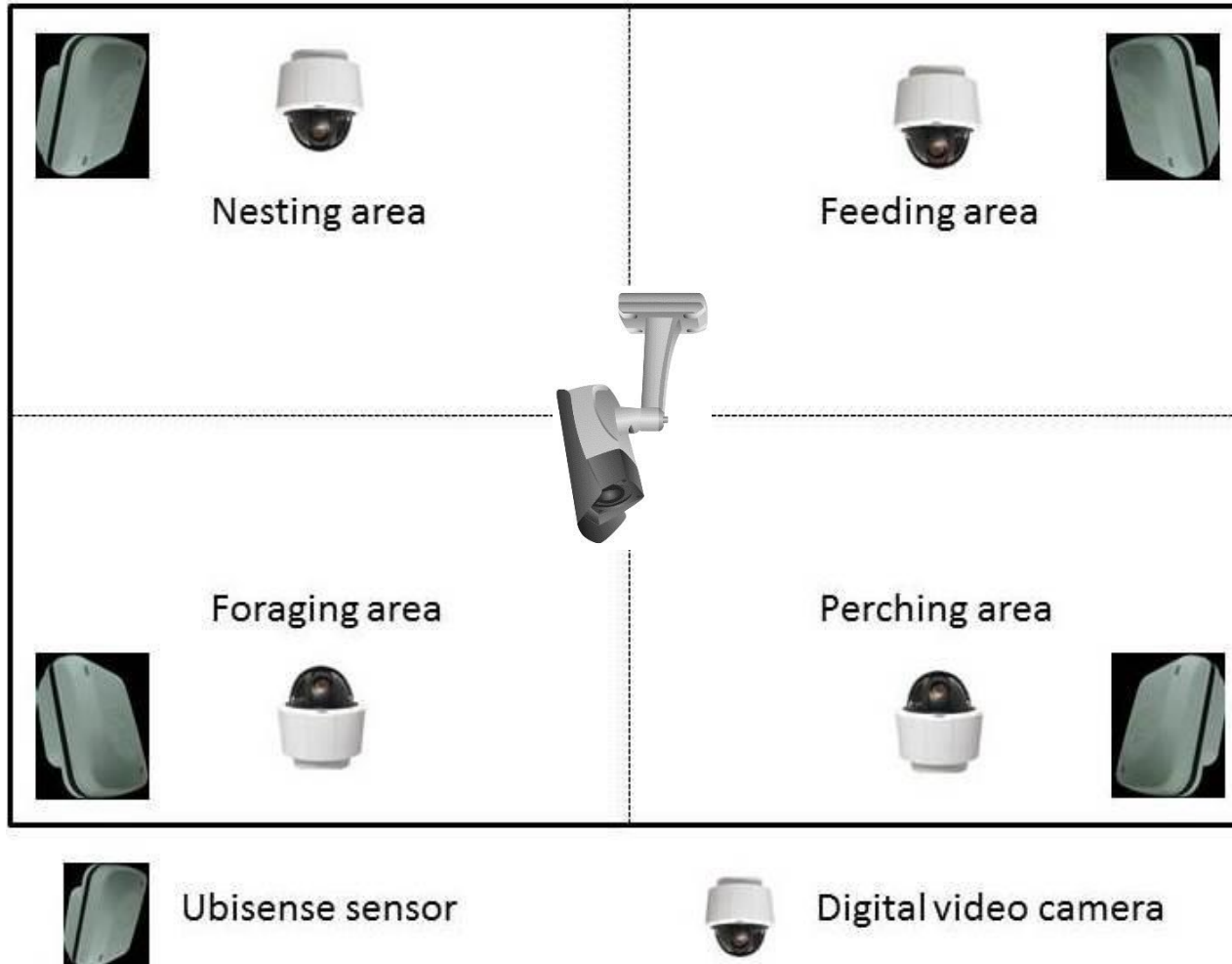
PhenoLab project

- Automatic recording of individual phenotype in group-housed hens
 - Location
 - Activity
 - Proximity (distance to others)



The poster features the title 'PhenoLab' in large green font at the top. Below it, the subtitle 'Sensor-based recording of location, activity and proximity in laying hens' is written in a smaller green font. A central photograph shows several brown laying hens in an outdoor setting, with a green circular line overlaid on the image. At the bottom of the poster, there are four logos: 'BREE4FOOD' (a green and white logo with a cow and sheep), 'Noldus Information Technology' (the Noldus logo in green and black), 'iWB' (a logo with a green '3' above a purple 'iWB' box), and 'WAGENINGEN UNIVERSITY & RESEARCH' (the Wageningen logo in green and blue). To the right of the Wageningen logo is the text 'UNIVERSITY OF TWENTE.'

Basic set-up testroom at Carus



Three different systems

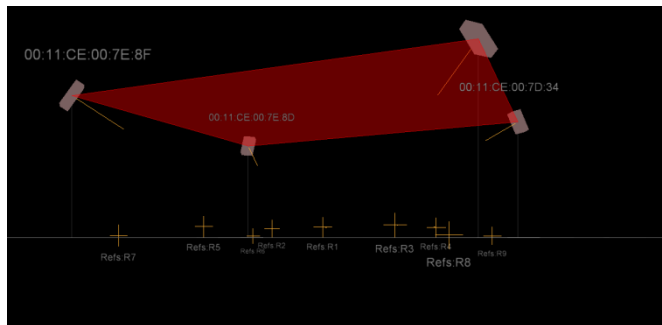
- **The Observer:** 'traditional' video recordings for manual behaviour recording
- **Ethovision:** automatic video tracking (indiv/group)
- **TrackLab:** ultra wideband (UWB) tracking of active tags

All three systems linked together, allowing to validate UWB system for automated phenotyping

Ultra-wideband sensors TrackLab



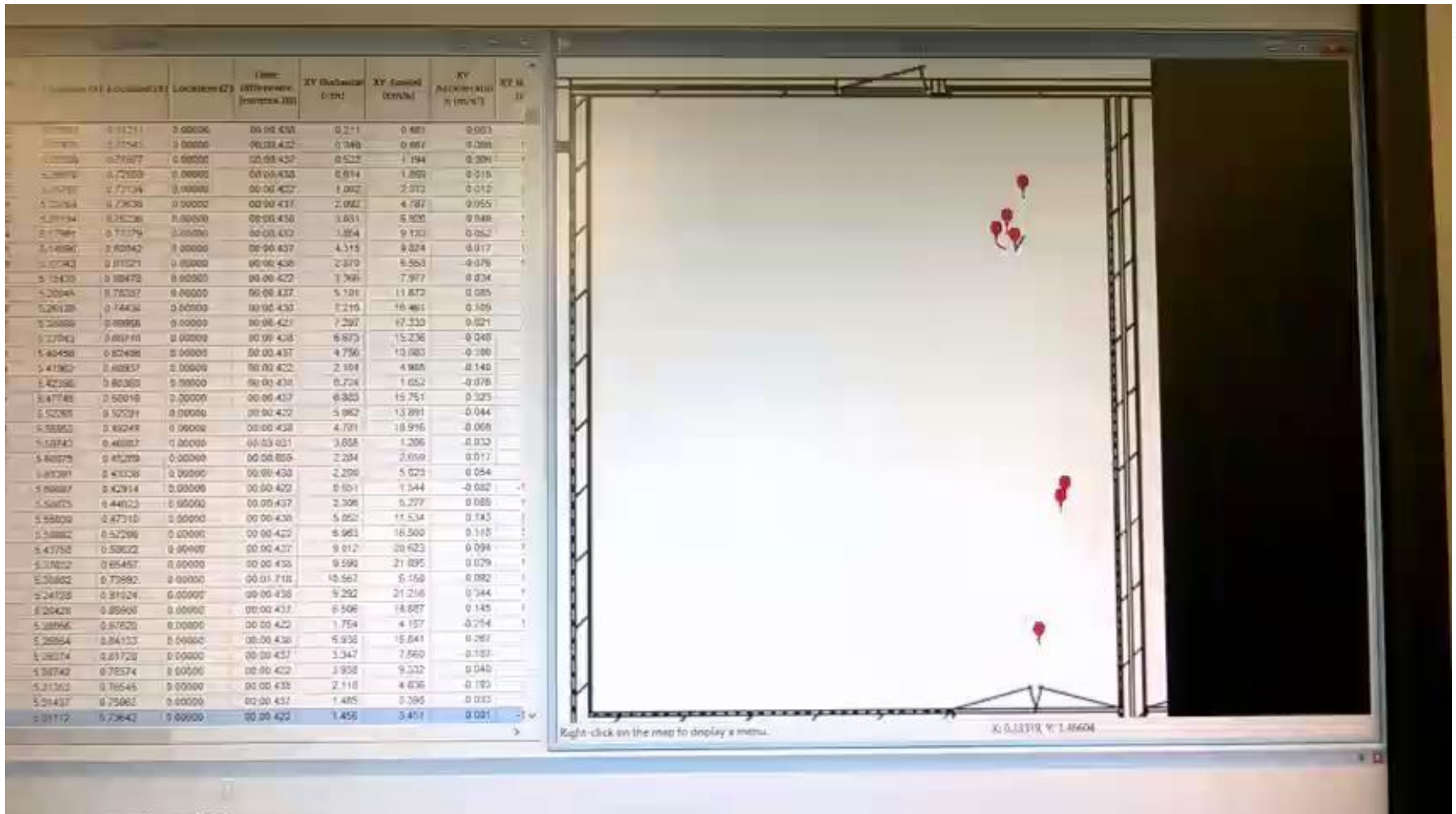
Sensor detection: time of arrival, angle of arrival



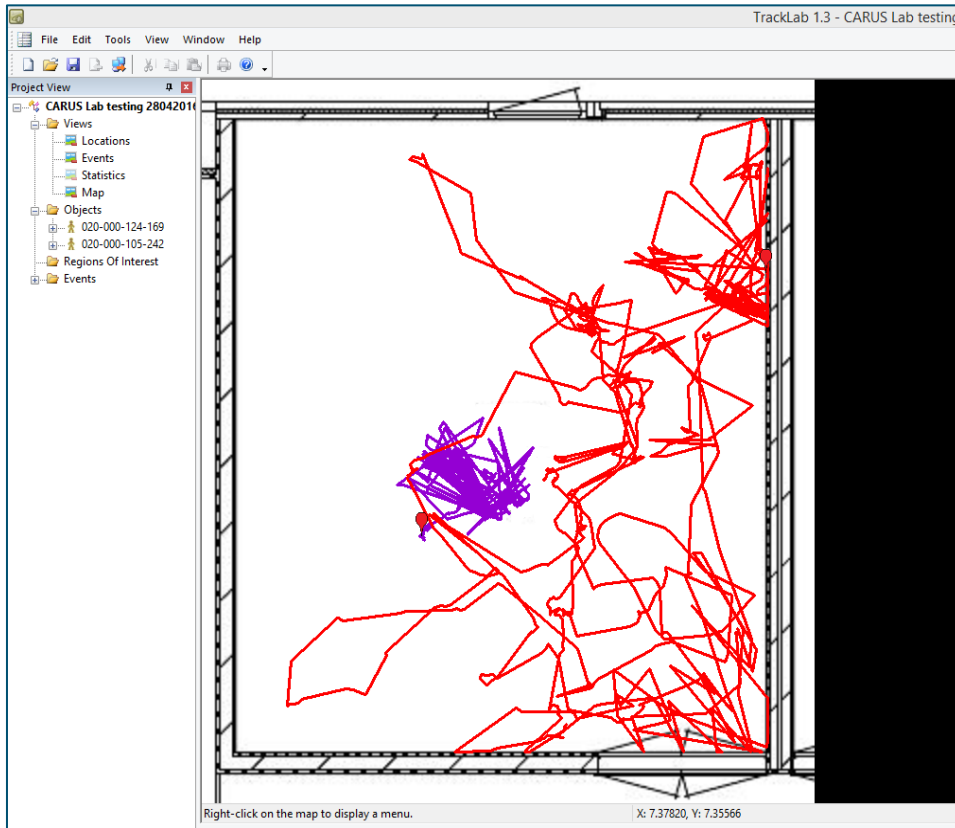
Ultra-wideband sensors TrackLab

- Active tags placed on the birds
- Location of each bird is determined twice per sec
 - Time of arrival
 - Angle of arrival
- Each tag contains a 12V battery (3.5 x 3.5 cm; 29 grams, 5 wk battery life)

Data acquisition in TrackLab



Output TrackLab



X,y,z coordinates are transferred to TrackLab 1.3 ® Noldus

Average speed, distance moved are calculated

Future: distance between various individuals



Validation using individual animals

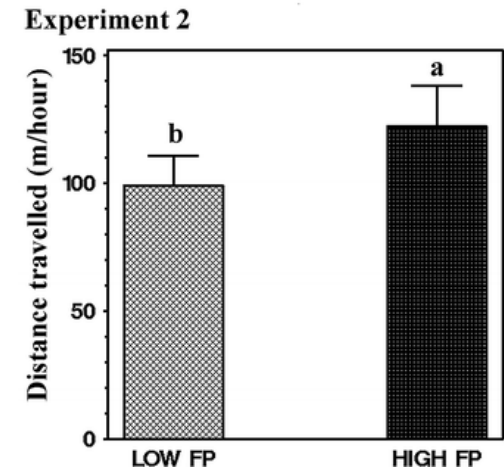
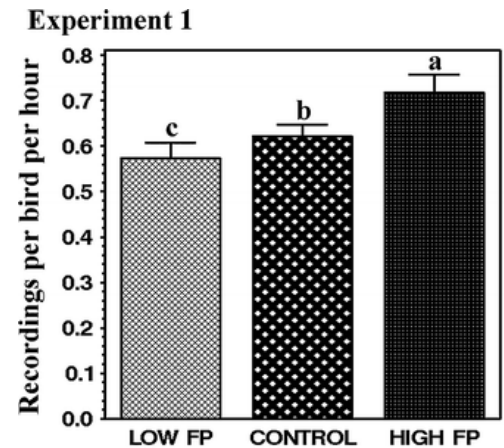
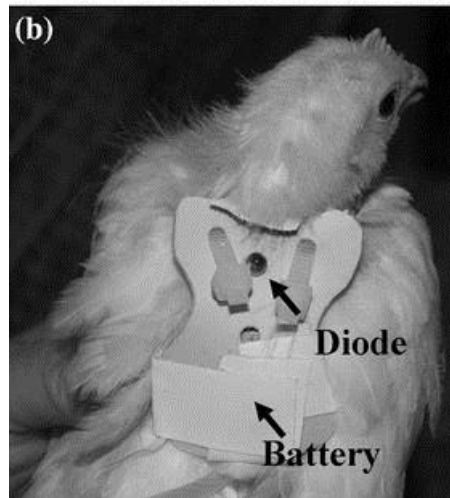
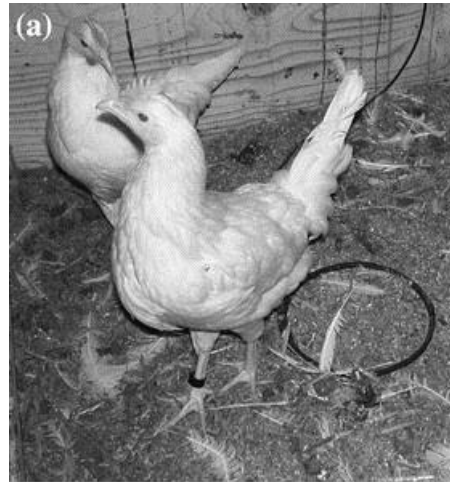
- Distance moved: 96% similar (24 tracks)



- Group setting: only UWB allows correct tracking individuals (same data corrections as for individual)

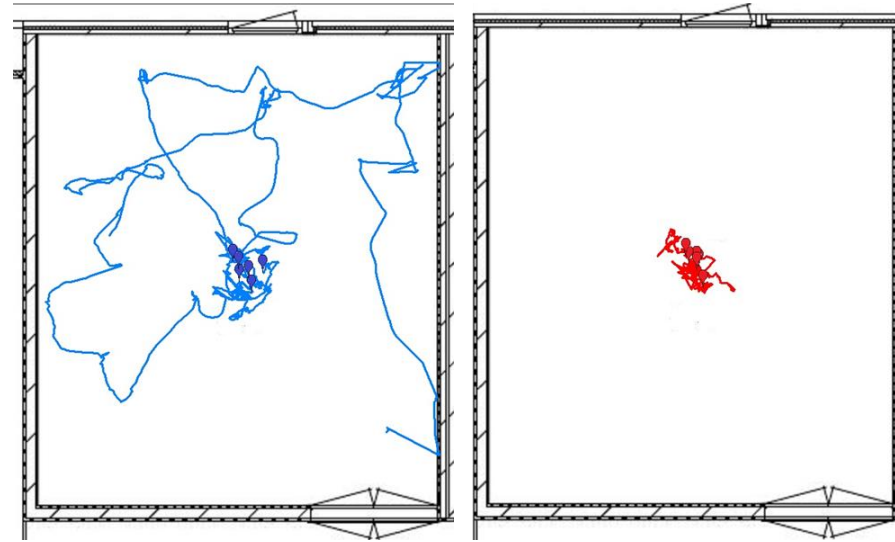
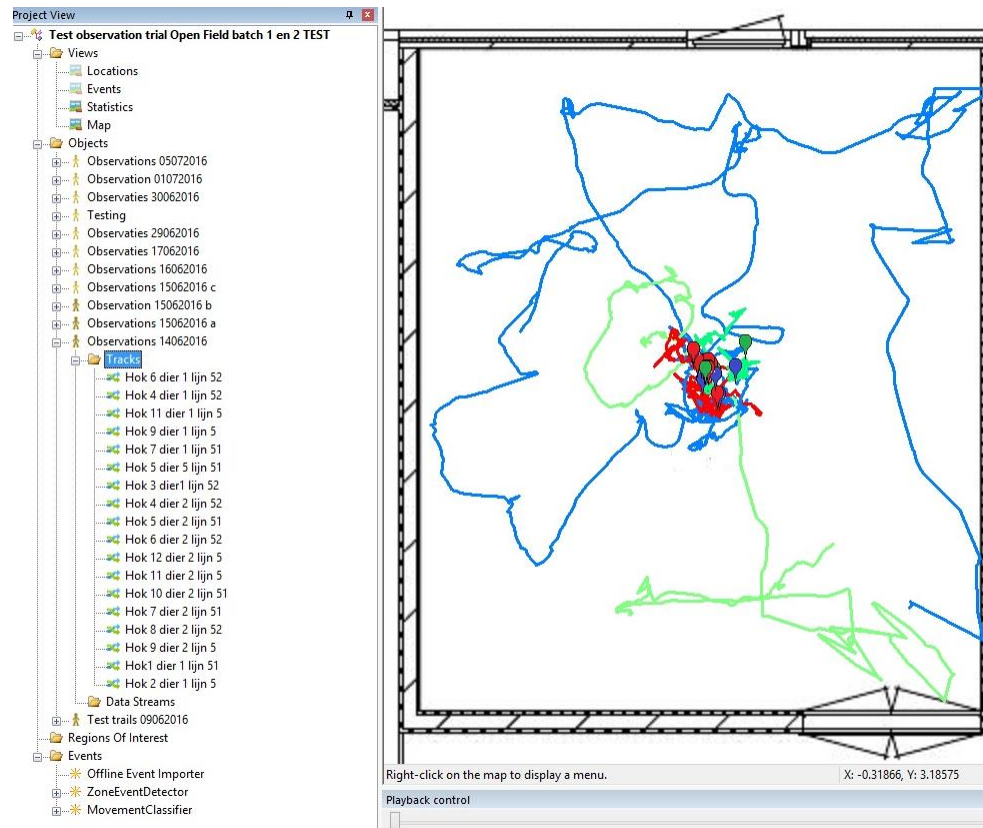
How we have used it

- Selection lines:
 - High Feather Pecking
 - Low Feather Pecking
 - Control
- High Feather Peckers hyperactive
- Feather peckers more attracted to litter or feathers



Kjaer, 2009

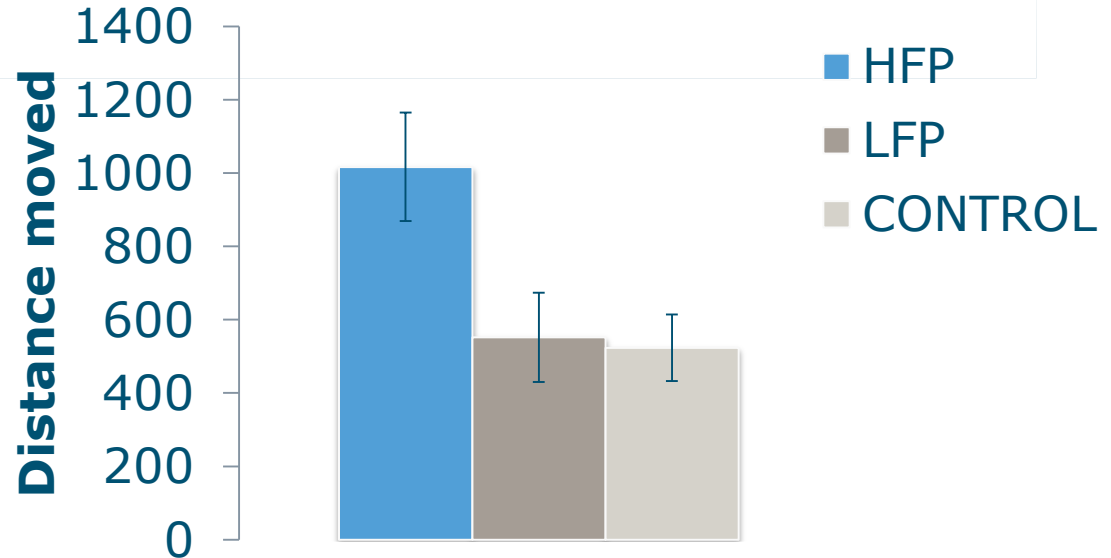
Activity pattern per line (FP selection)



Line differences

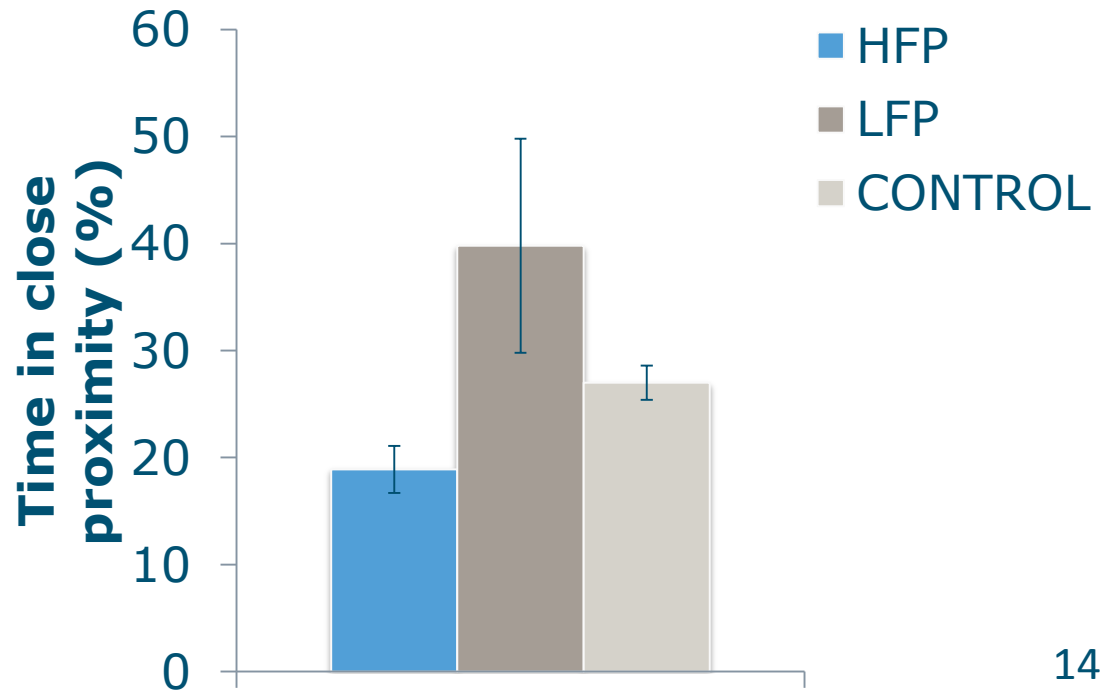
Distance moved

5 min in test-room
alone



Proximity

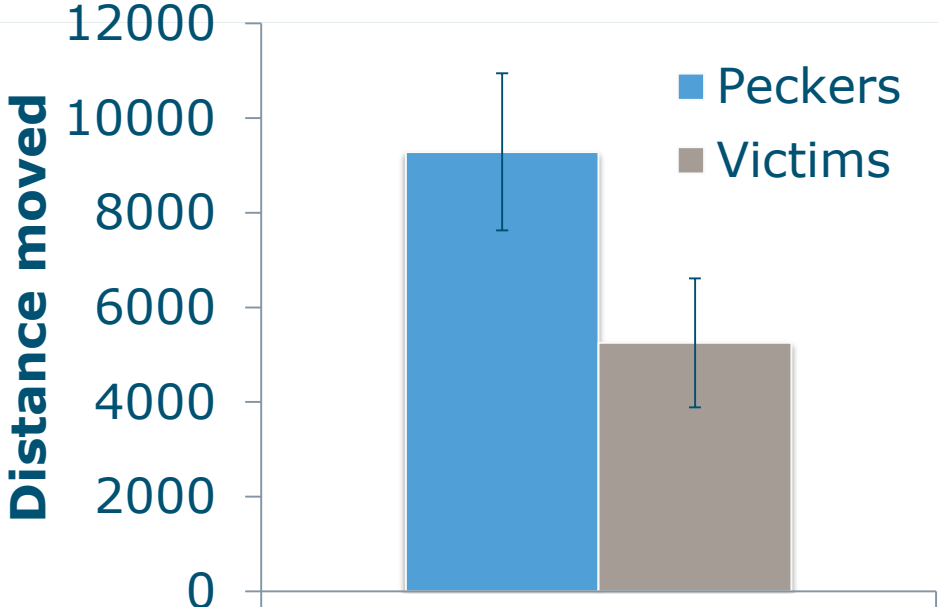
15 min in test-room in
group



Phenotypic differences

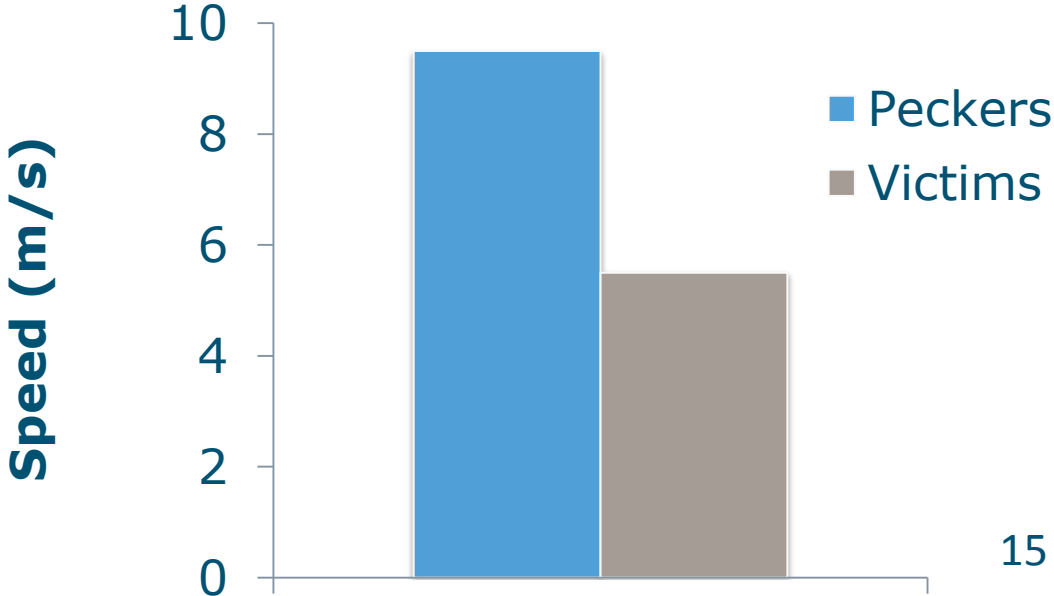
Distance moved

5 min in test-room alone



Speed

5 min in test-room in group



UWB tracking promising tool

- UWB tracking corresponds well to individual video track
- Line differences in activity confirmed
 - High feather line more active + further apart
- Able to detect individual differences within a group
 - Peckers more active than victims
- Fixed identity makes that method suits breeding



Follow-up



- PhD student on development of methods for tracking individual animals in groups
 - Activity poultry
 - Social interactions pigs
 - Use of space in dairy cows

PhenoLab

Sensor-based recording of location, activity and proximity in laying hens



Noldus
Information Technology



 WAGENINGEN
UNIVERSITY & RESEARCH

UNIVERSITY OF TWENTE.

Thank you!

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- The Breed4Food partners Cobb-Europe, CRV, Hendrix Genetics and Topigs Norsvin.

