Sensing the worms

Automated behaviour monitoring for detection of parasitism in grazing livestock

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Skövde

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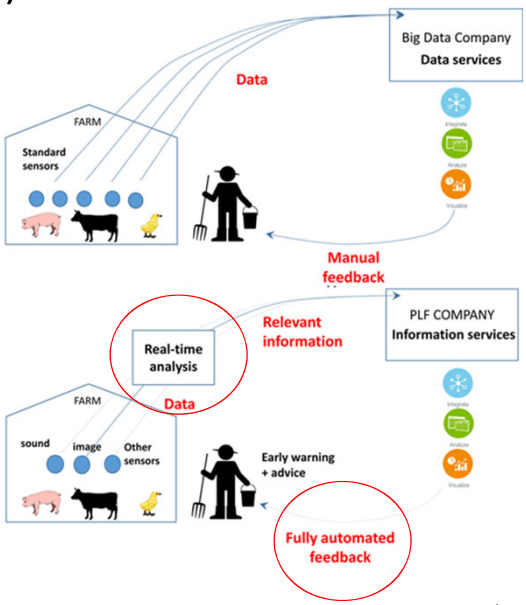
Gastrointestinal roundworms in sheep

- Affects lambs and pregnant ewes
- Associated with a subclinical course of infection[1]
  - Production losses
  - Estimated annual costs of lost productivity and costs spent on anthelmintic treatment in sheep production. Norway: € 3.500.000, Sweden: € 550.000[3]
- Parasitic gastroenteritis (PGE)[1]
  - Watery diarrhoea, dull hair coat, anorexia and a loss of general body condition, oedema, anaemia
- Complex community of GIN[2]
  - *Haemonchus contortus* – abomasal worm, blood feeder
  - *Teladorsagia circumcincta* - damages the parietal cells
  - *Trihostrongylus vitrinus* - intestinal dweller

[1]Sutherland & Scott 2010, [2]Halvarsson & Höglund 2021, [3]Charlier et al. 2020

Precision Livestock Farming (PLF)

"Management of livestock by continuous, automated, real-time monitoring of production/reproduction, health and welfare of livestock, and environmental impact"



Berckmans, 2017

Precision Livestock Farming (PLF)

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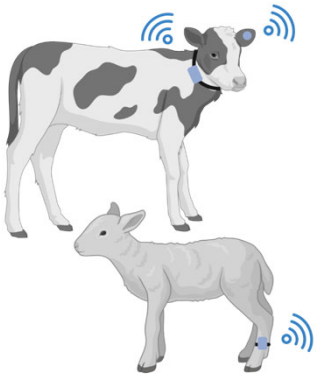
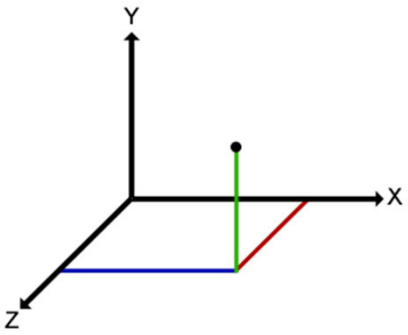
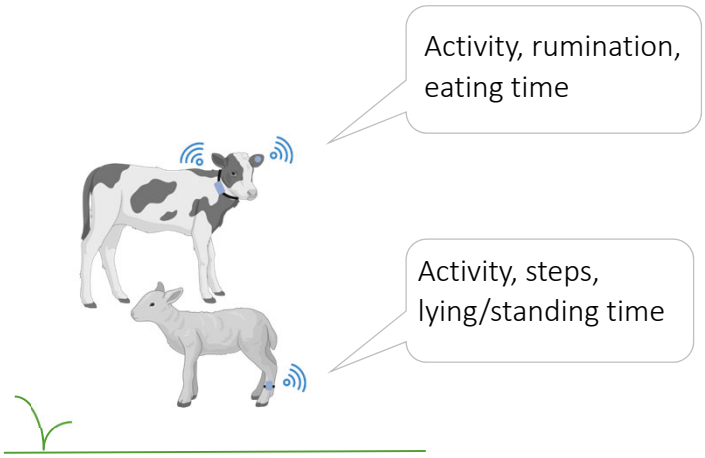
"Fitbits for animals"

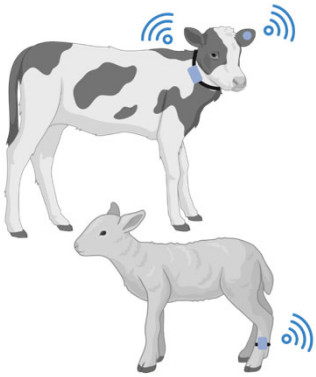


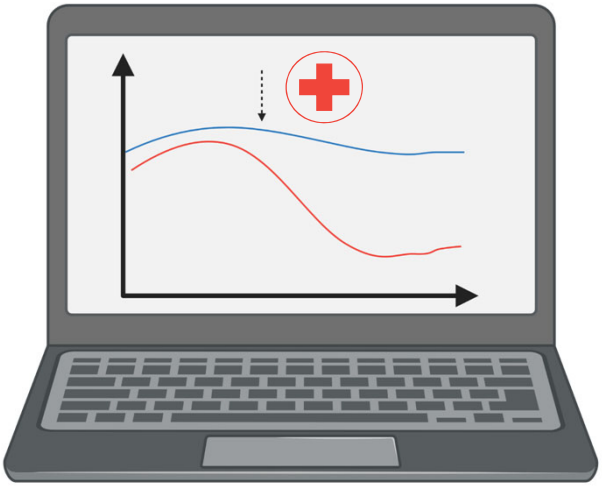


"Fitbits for animals"

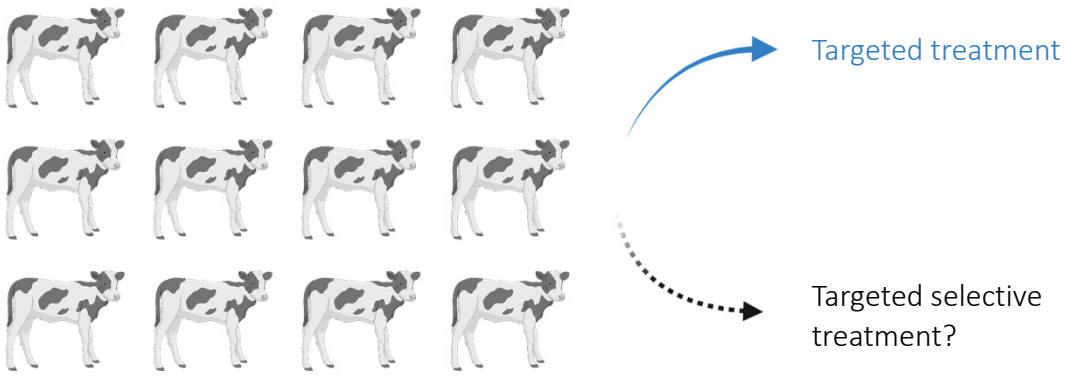


Sickness behaviour





Future treatment strategies?



Overall aims

- Investigate if multispecies GIN parasite infections affect behavioural patterns in grazing livestock.
- Identify and test commercially available sensor systems recording behavioural and activity patterns.

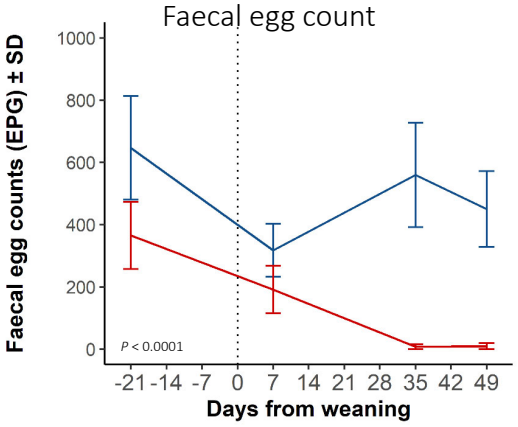
Validation study

Experimental design study I

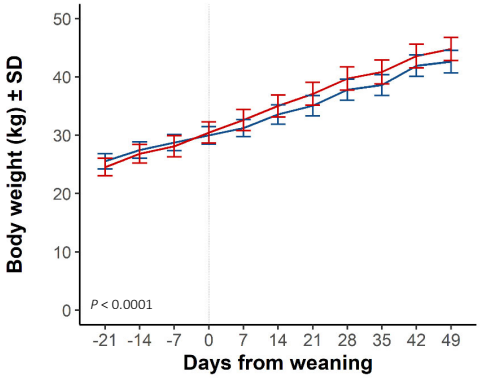
- All animals exposed to GIN on pasture
  - **High Parasite** (HP) not dewormed
  - **Low Parasite** (LP) dewormed monthly
- 30 HP & 28 LP – 4 groups

Results – Study I

Faecal egg count



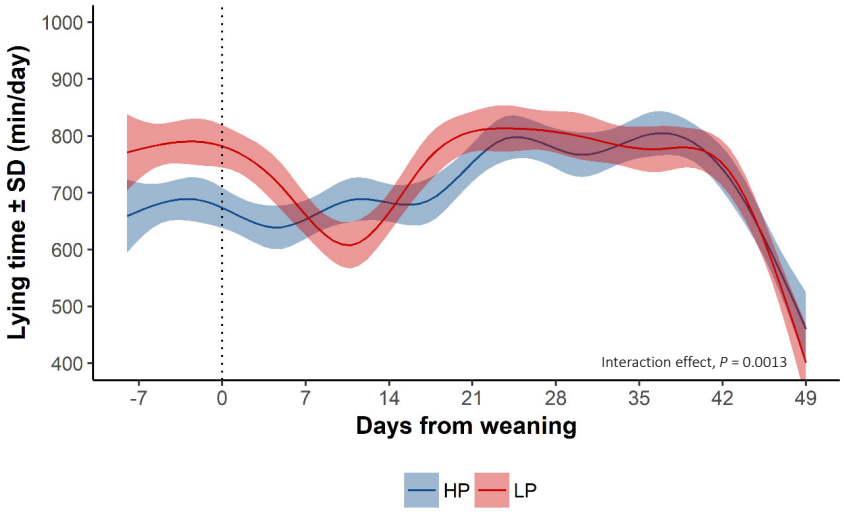
Body weight



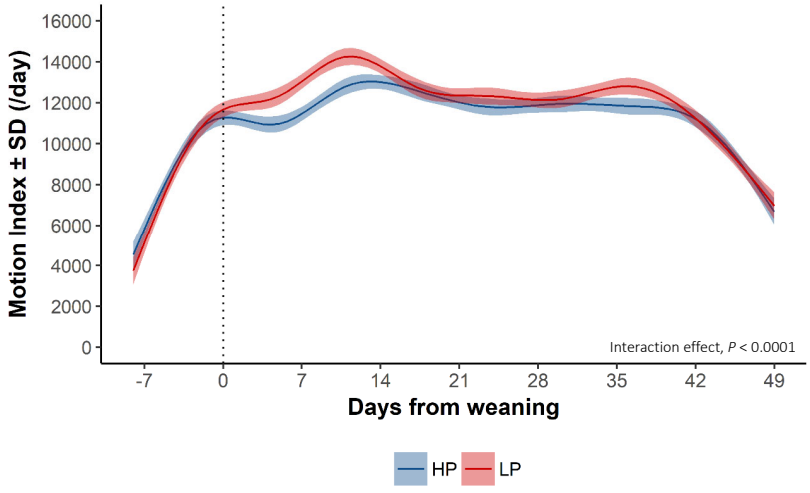
- Subclinical levels of GIN
- Difference in infection levels
- Predominantly *Teladorsagia circumcincta*

LP

Lying time



Motion Index



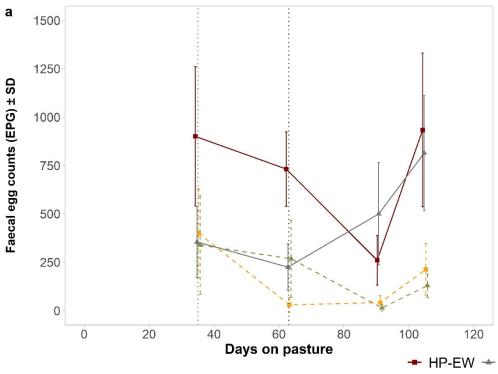
Experimental design study II

- All animals exposed to GIN on pasture
  - **High Parasite** (HP) - untreated
  - **Low Parasite** (LP) - dewormed at weaning
  - **Early weaning** (EW) – 10 weeks
  - **Late weaning** (LW) – 14 weeks

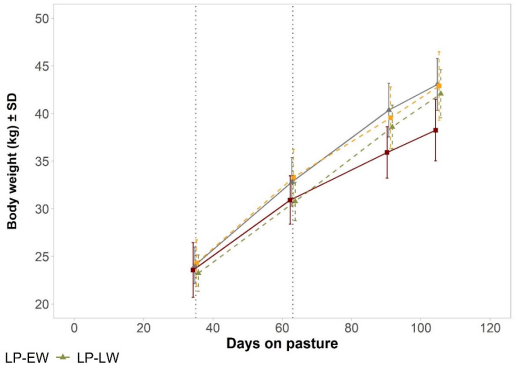
- 4 groups – 39 lambs in total

Results – Study II

Faecal egg count



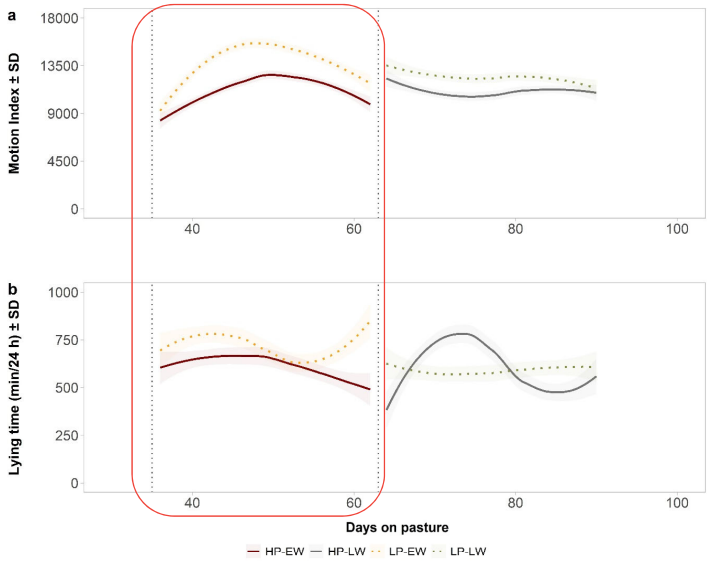
Body weight



- Difference in infection levels
- High parasite (HP) early weaned (EW) animals had a lower BWG

Results – Study II

- Motion Index 19 % lower
- Daily lying time 15 % lower



Conclusions

- Signs of sickness behaviour
  - Less active
  - Shorter lying time
- Possible link between mucosal damage and behavioural responses
- Possible link to infection level
  - Needs to be further investigated

Acknowledgement

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