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Comparing agreement between methods of lameness detection in Holstein Friesian dairy cattle

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Introduction

- Lameness still 1 of top 3 reasons for culls in UK
- DairyCo recommends weekly mobility scoring
- UK dairy farms decreasing in number but increasing in size
- Time consuming
- Is automated detection the answer?

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Aims

- Explore force plate lameness detection
- Compare ground reaction forces to lesions
- Recommend viable on-farm practices
- Reduce timeframe for treatment

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Methods and Materials

- 5 force plates
- Built into parlour exit
- Walked over twice daily
- Cows electronically tagged
- Weekly mobility scores
- Distal limb radiographs
- Foot trim
- Lesion score *(Bergsten 1995)*

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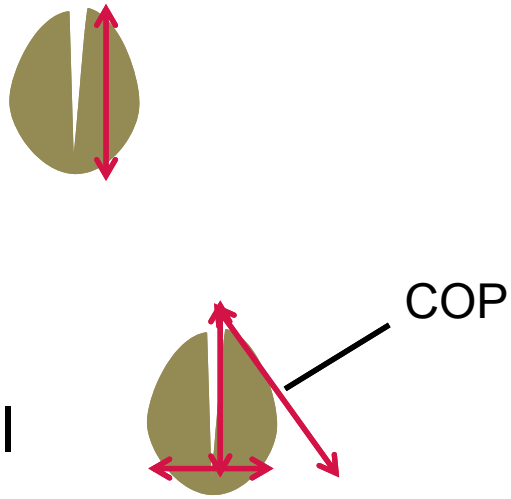
Data gathered

Ground Reaction Forces (GRF)

- Stance Time (ms)
- Load Rate (N/ms)
- Centre of pressure travel (mm):
  - (x) Forward/Backward
  - (y) Sideways
  - (COP) Total travel



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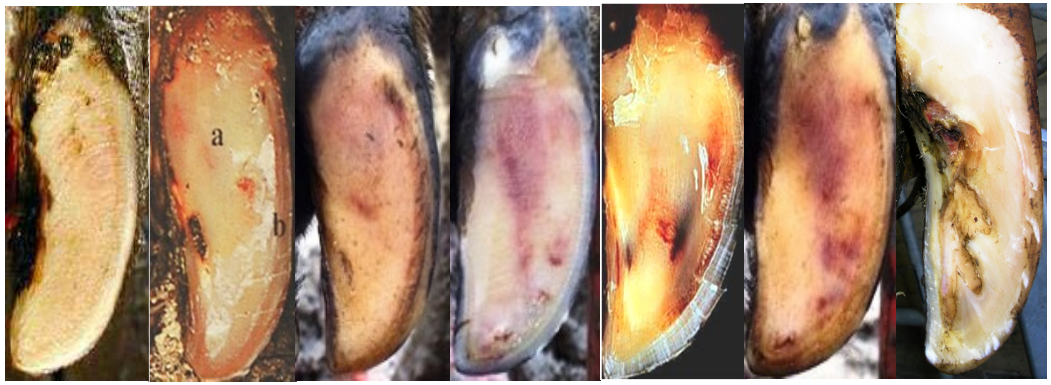
Data gathered

Lesion Description	Score
No haemorrhage	0
Slight haemorrhage (small area)	1
Slight haemorrhage (large area)	2
Moderate haemorrhage (small area)	
Moderate haemorrhage (large area)	3
Severe haemorrhage (small area)	4
Severe haemorrhage (large area)	5
Exposed Corium	6



Radiographic Pathology
Osteophyte(s)
Remodelling
Osteitis
Horn disruption
Severity 0-3

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Statistical analysis

- Fixed model analysis run in ASReml
- Model used
  - GRF = mu + parity + foot + (RS or SL)
- GRFs include load rate, stance time, forward movement, sideways movement and COP

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Results: GRFs vs Limb damage

	Forward (mm)	Sideways (mm)	Stance Time (ms)	Load Rate (N/ms)	COP (mm)
Mean	87.9	66.3	253	40.2	124
SD	40.2	23.2	46.2	12.6	46.1
Solar Lesion Score	-	*	-	**	* *Left*
Radiographic Pathology Score	-	* *Right*	* *Left*	* *Left*	*

* = $P < 0.05$ ** = $P < 0.01$

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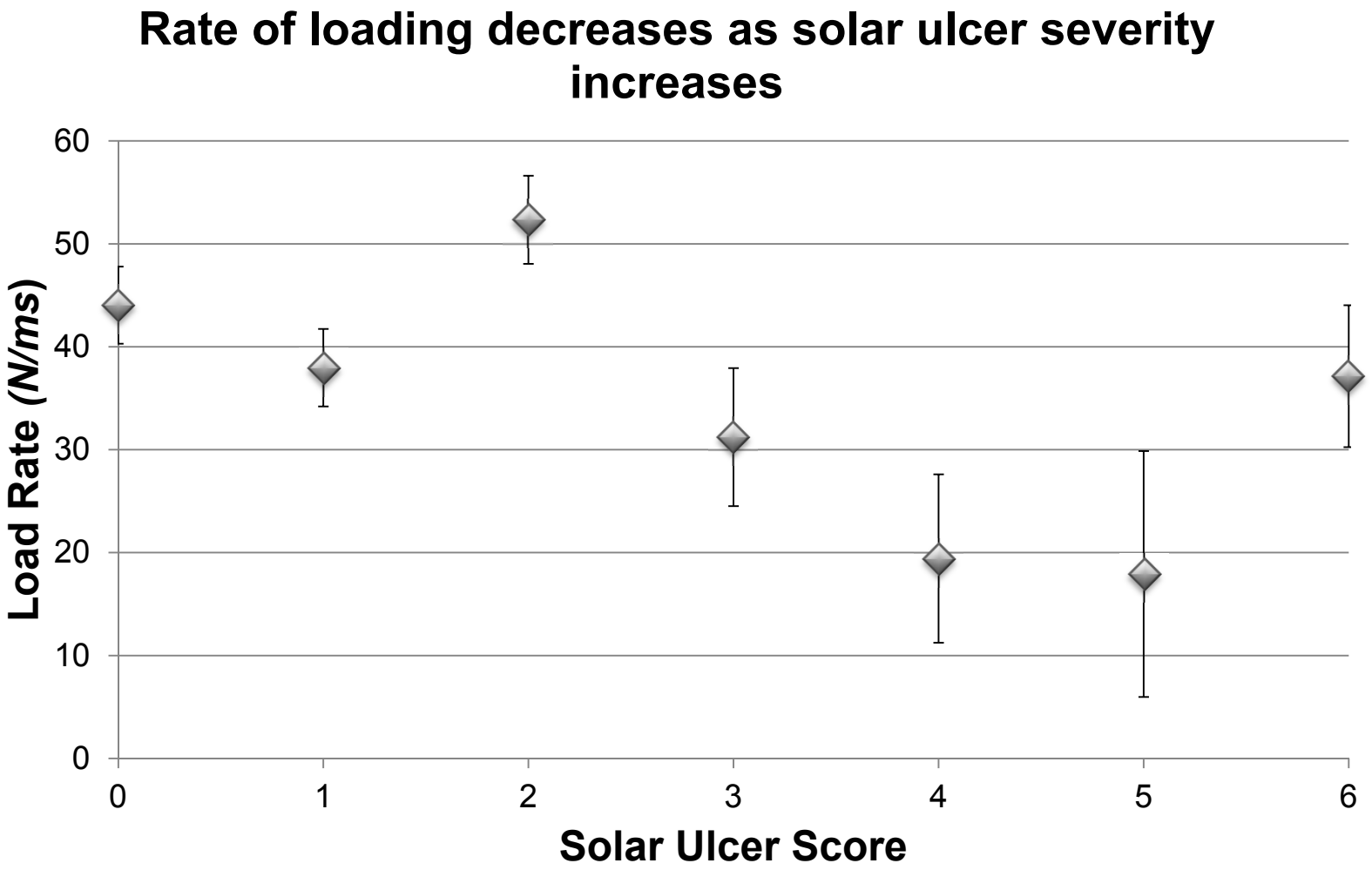
Results: Lesion Score effect on Load Rate



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Conclusions

- Significant association between certain GRFs and clinical limb damage
  - Load rate and stance time especially
- More reliable lameness indicator than radiographs
- Force plates can highlight limb/foot pathology

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Further investigation

- Predict lame feet using GRF thresholds
- Larger study group: more “damaged” limbs
- Study contralateral limb compensation

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Thank you for listening

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