

# THE EFFECT OF HOOF TRIMMING



Agricultural Research  
Organization  
ARO  
Israel

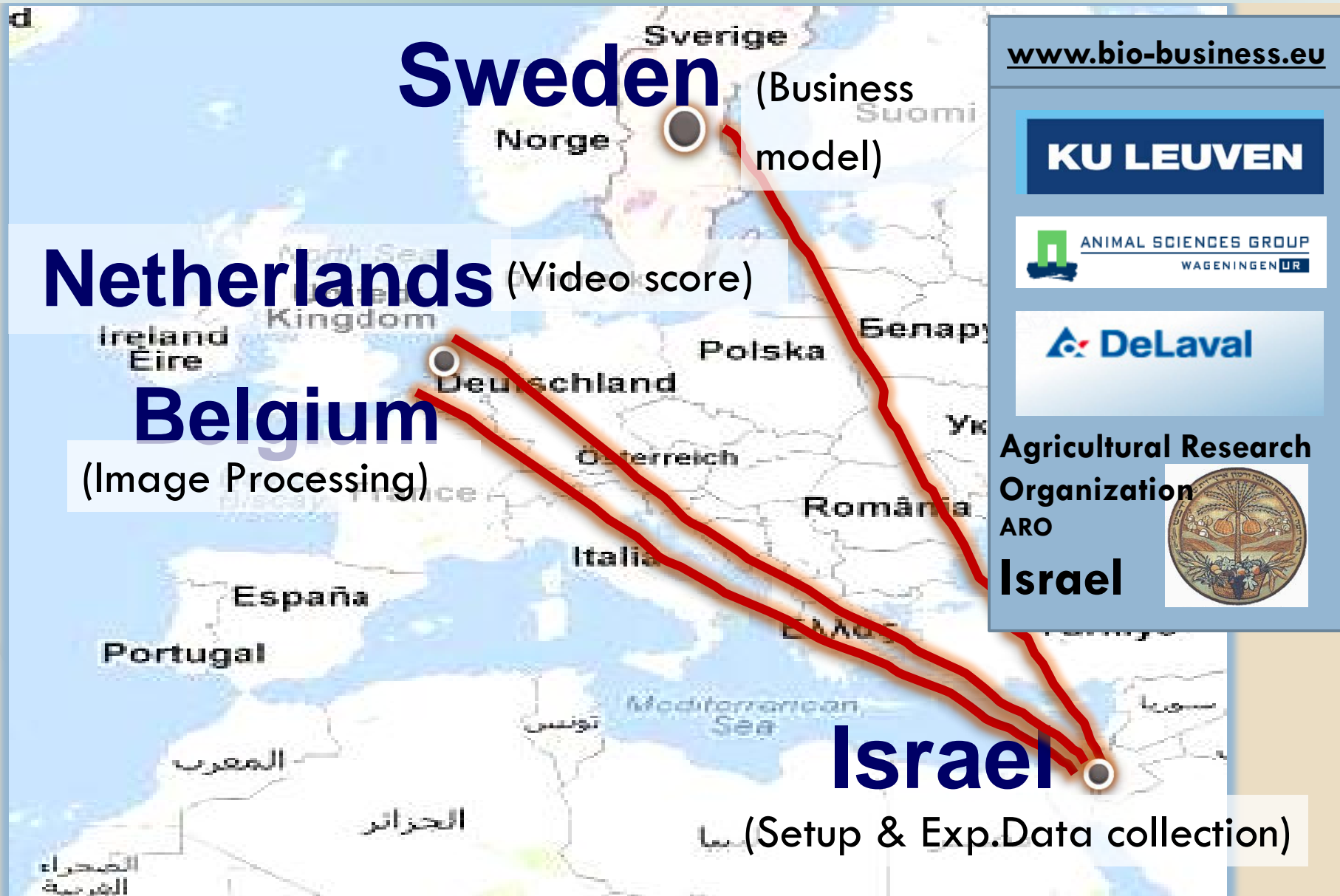
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**KU LEUVEN**

64th Annual EAAP Meeting, Nantes, August 2013

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# BioBusiness "Cow group" partners



# Continuation

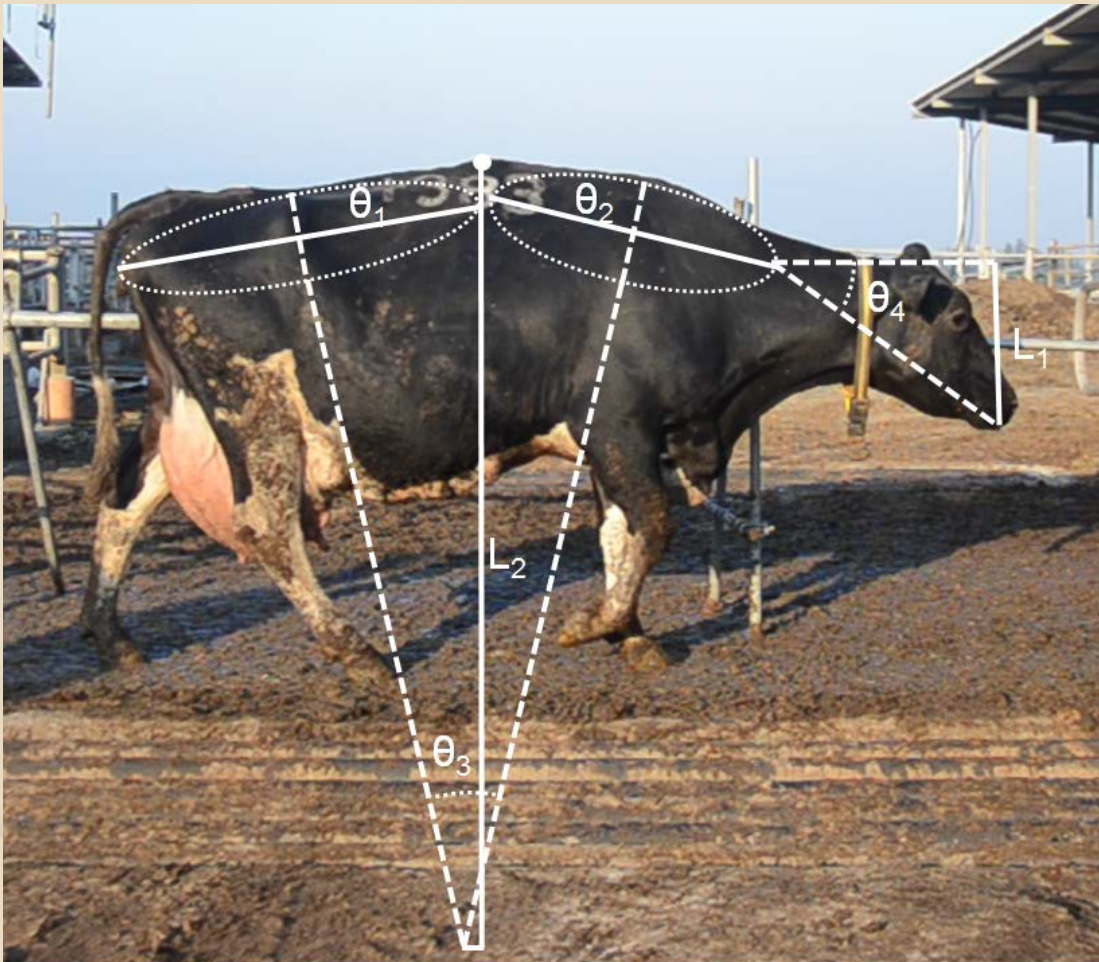
## Last Year (2012) EAAP meeting

- The development of machine-vision based sensors:
  - **Automatic Body Condition Scoring**
  - **Automatic Lameness Detection**

## This EAAP (2013) meeting

- **Application of these sensors**

# Automatic Lameness detection



**computer vision**



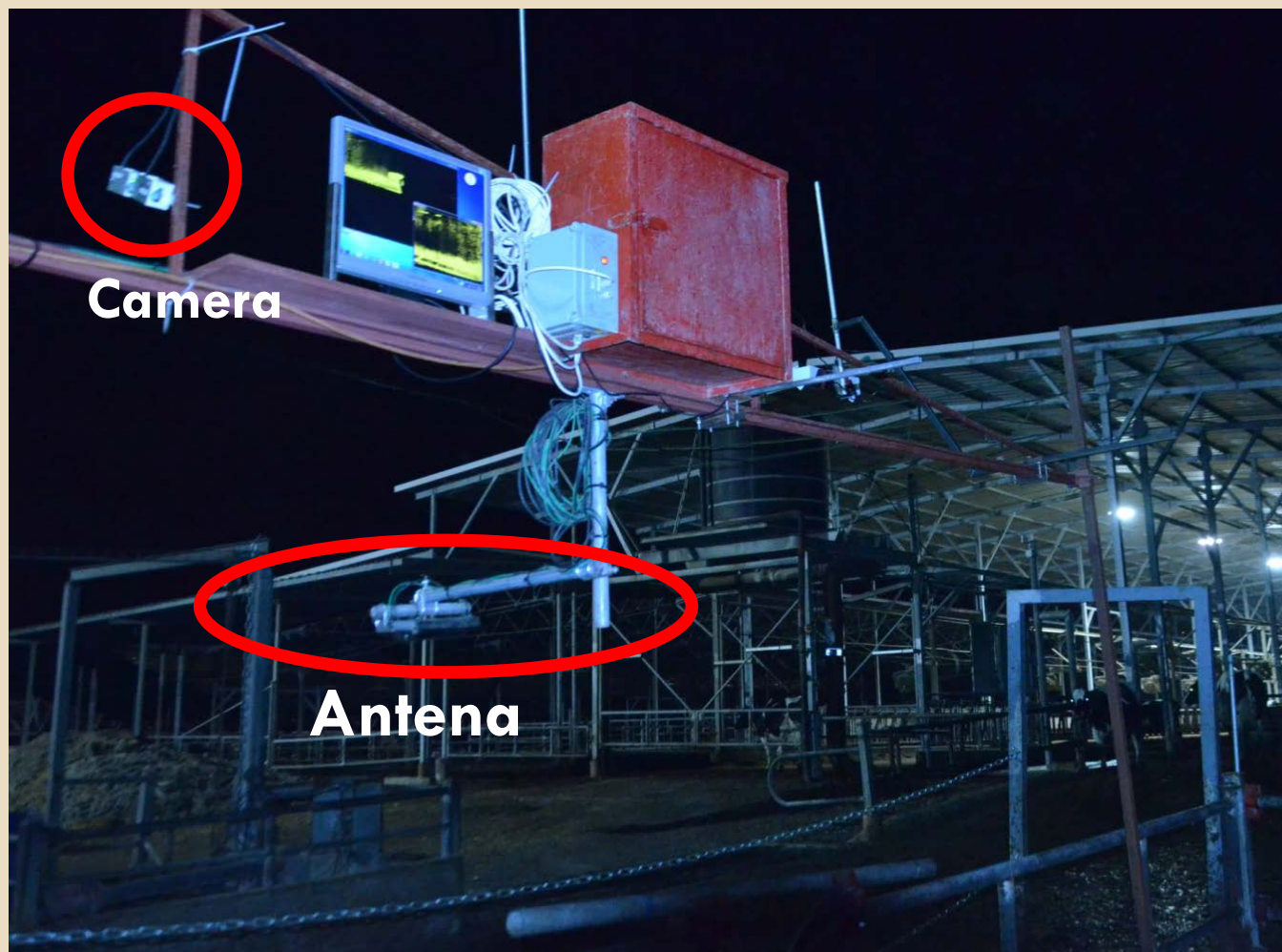
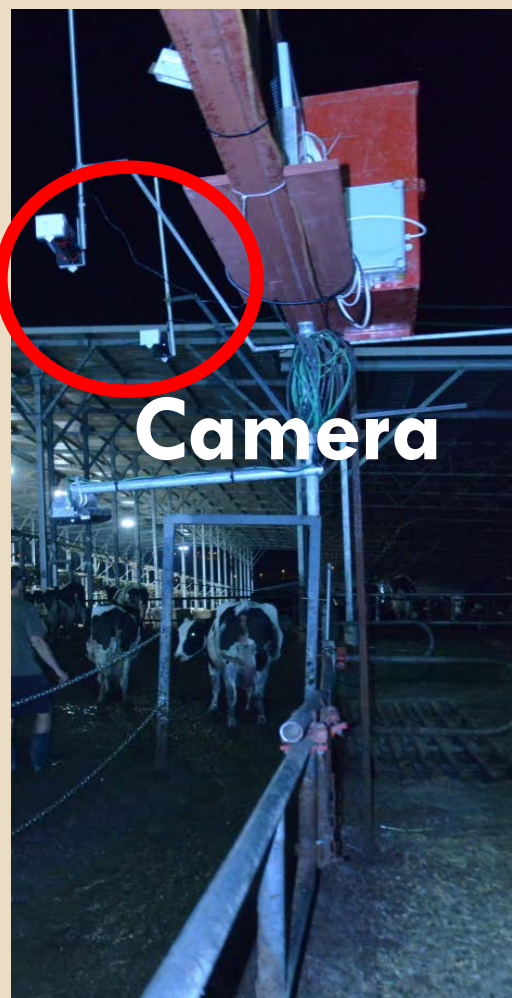
$$BMP = w_1 * \frac{\theta_2}{\theta_1} + w_2 * \frac{\theta_4}{\theta_3} + w_3 * \frac{L_1}{L_2}$$





# 3<sup>rd</sup> Setup: 3D-camera

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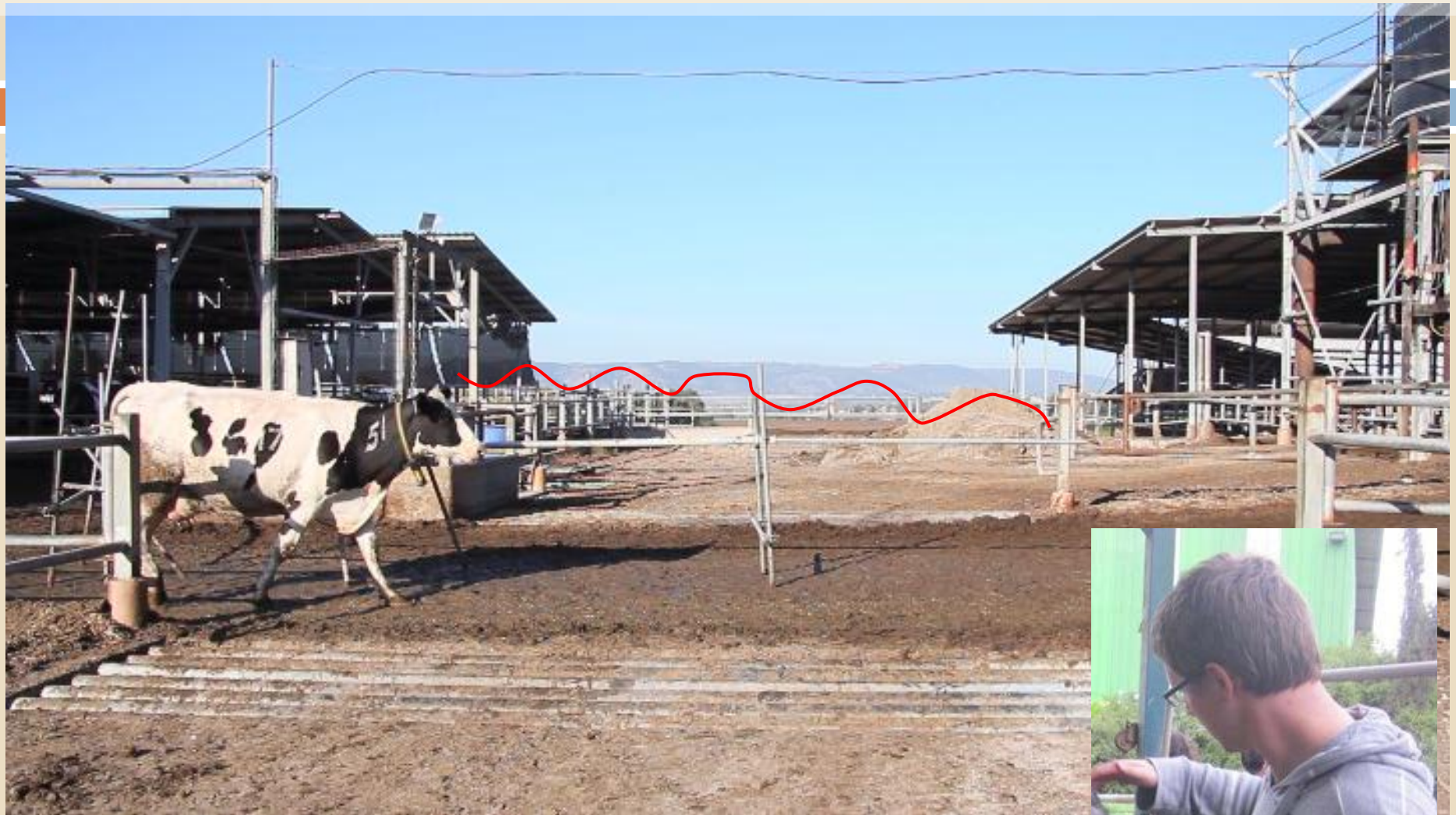


# Automatic detection: BCS and Lameness





# Machine vision and human observation<sup>7</sup>



22 days → 1500+ recordings

# ~~Machine vision~~ vs. human observation

**Last EAAP Meeting**

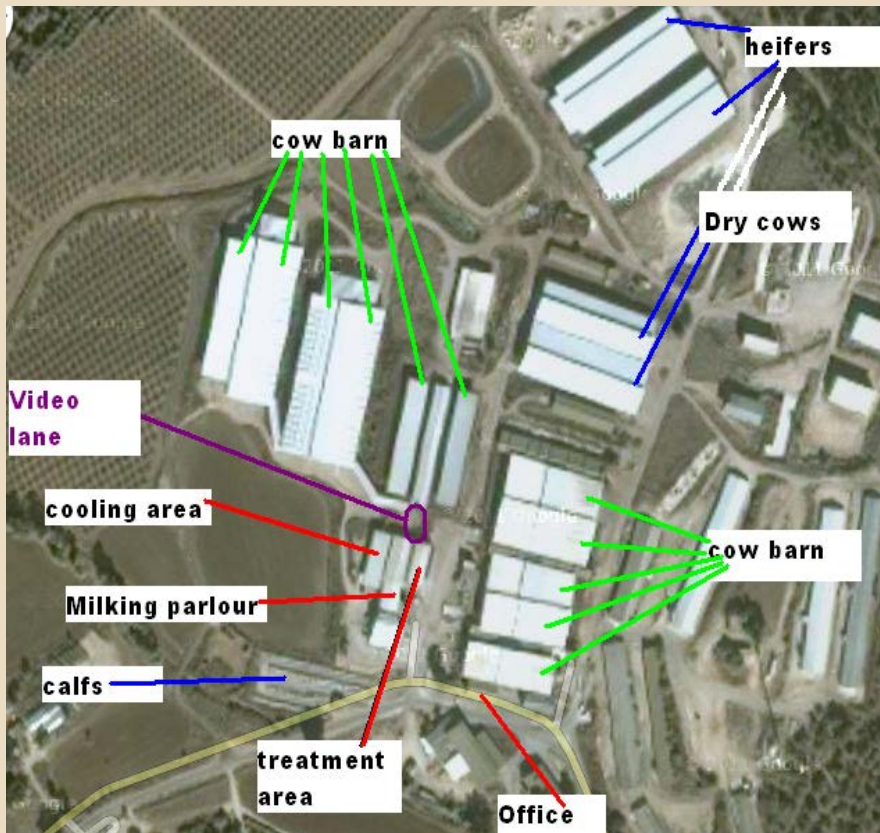


**This EAAP Meeting**



# Animal Sensing (Israel)

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Commercial kibbutz dairy farm

3x milking/day

Sensor-based heat detection and nutrition management

HR<sup>TM</sup>-tag (SCR Engineers Ltd., Netanya Israel)



# Lameness definition

Deviation in gait and posture (locomotion) resulting from pain or discomfort from hoof or leg injuries and disease



Welfare

Economic  
[300 NIS]

Prevalence  
[30%]

Causes



# Lameness treatments



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- Foot bathing
- Foot washing
- Hoof trimming





# Routine hoof trimming



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- **Refet Ha'Emek, kibbutz Yif'at**
  - **Twice per year**
    - **Before summer: May**
    - **Before winter: November**
  - **Whole herd (~1100 cows) in 10 days**

# Hoof Trimming procedure



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# Hoof disorders



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Disorder	Single	+1 other	+2 other	+3 other	# diagnosed
Dermatitis interdigitalis	40	7	1	0	48
Digital dermatitis	93	22	10	0	125
Double sole	56	41	15	3	115
Sole ulcer	5	25	13	3	46
Panaritium	15	12	4	0	31
Horn cavity	0	6	6	3	15
Torn hoof edge	0	1	5	3	9
Chronic laminitis	1	0	0	0	1
<b>Total</b>	<b>210</b>	<b>114</b>	<b>54</b>	<b>12</b>	<b>390</b>



# Hoof disorder identification

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□ Herd: 1097 cows → 299 cows (27%) with hoof disorder

□ Location

	front	hind	Both
N	44	237	18
%	15	79	6

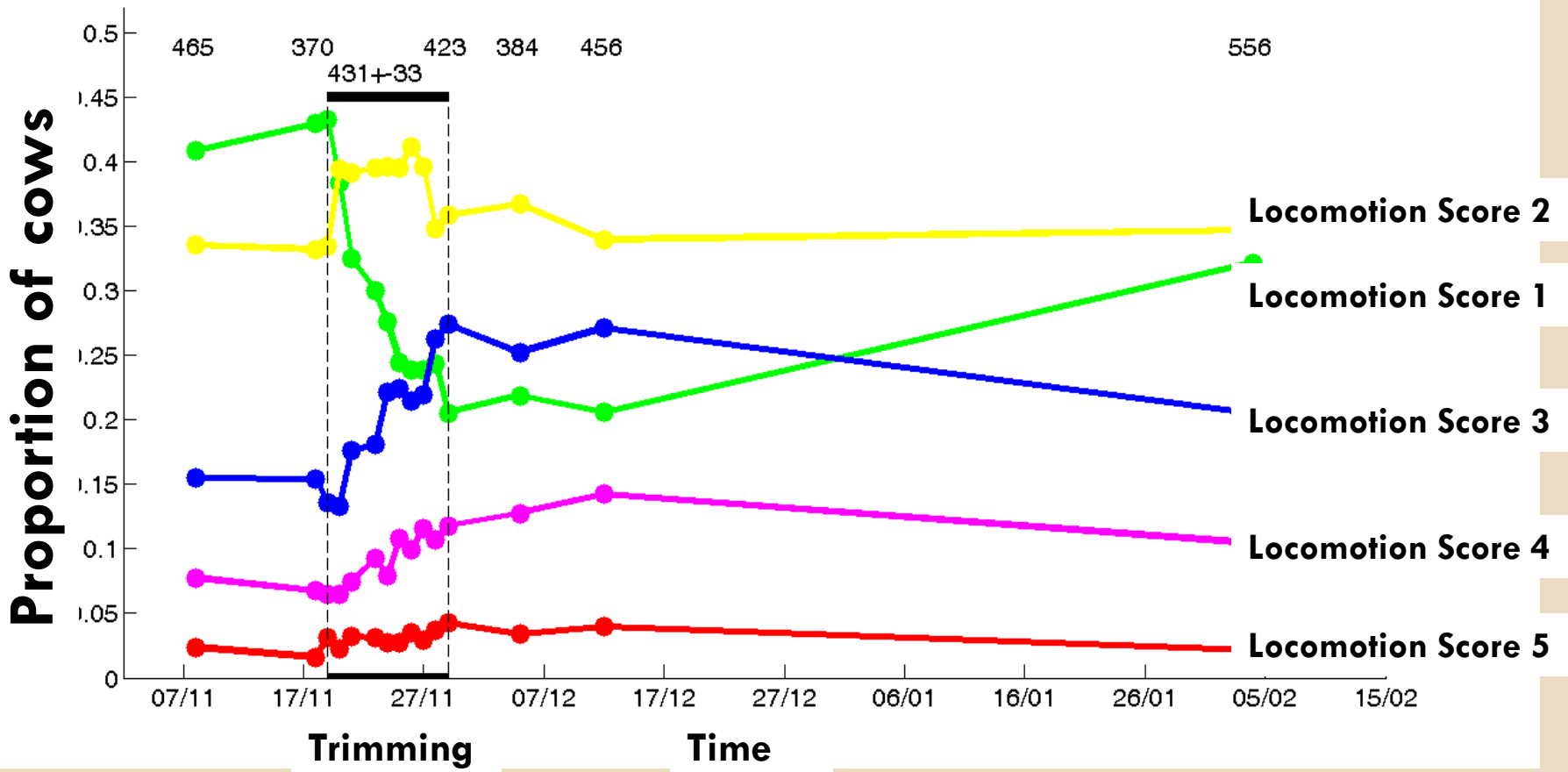
□ Number of legs

	Not spec.	#1	#2	#3	#4
N	1	217	74	4	3
%	0.3	72.6	24.8	1.3	1.0

□ Number of diagnoses

	Not spec.	#1	#2	#3	#4+
N	11	206	61	15	6
%	3.7	68.9	20.4	5.0	2.0

# Herd locomotion score



# Trimming period locomotion scoring



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- **19 live locomotion scoring sessions**
  - **5 sessions**
- **Individual cows scored throughout all 5 sessions**
  - **54 lame cows**
  - **109 nonlame cows**
- **Missing individuals**
  - **Cow traffic**
  - **Group changes**

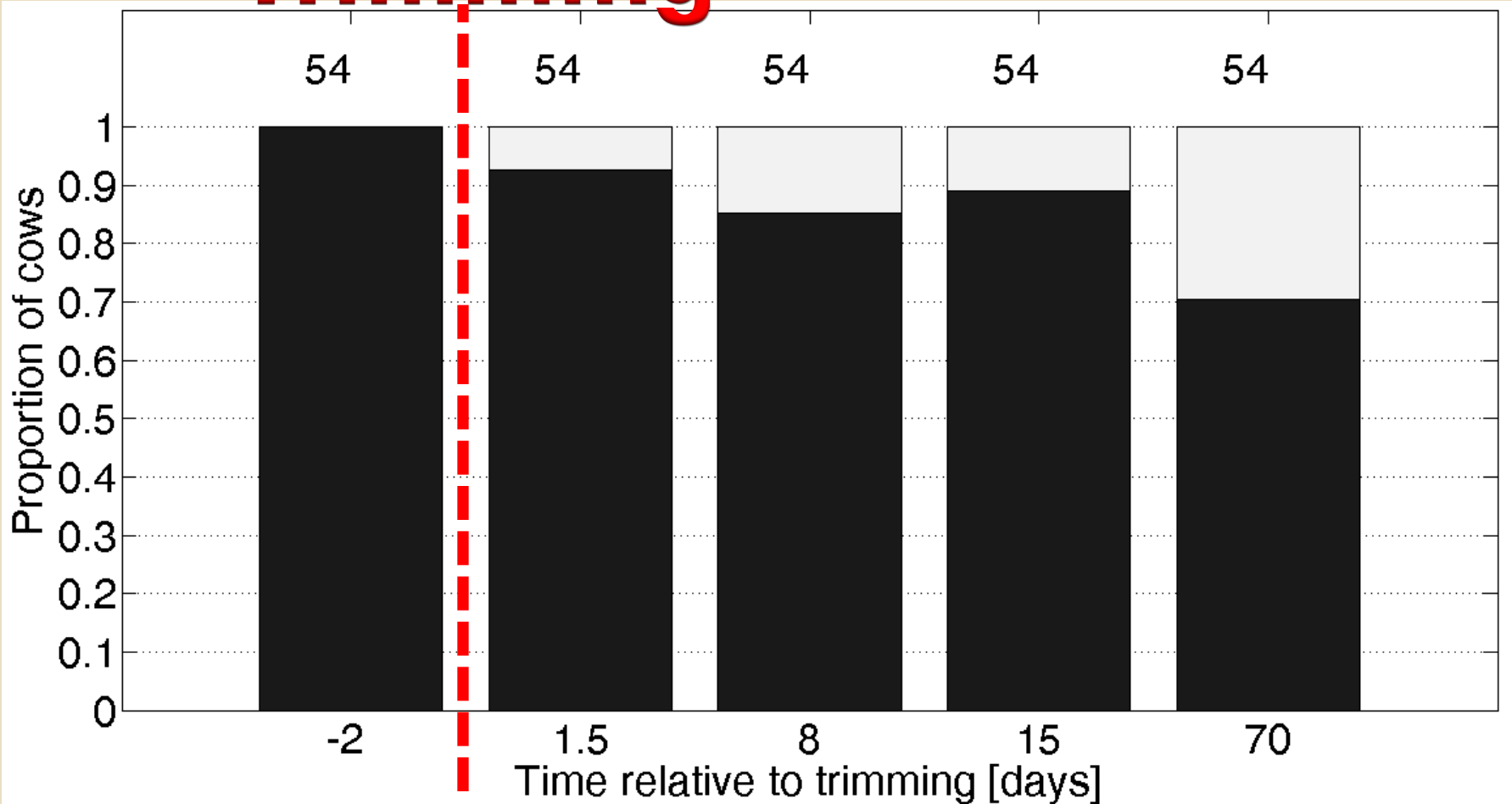


# Lame cows



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## Trimming

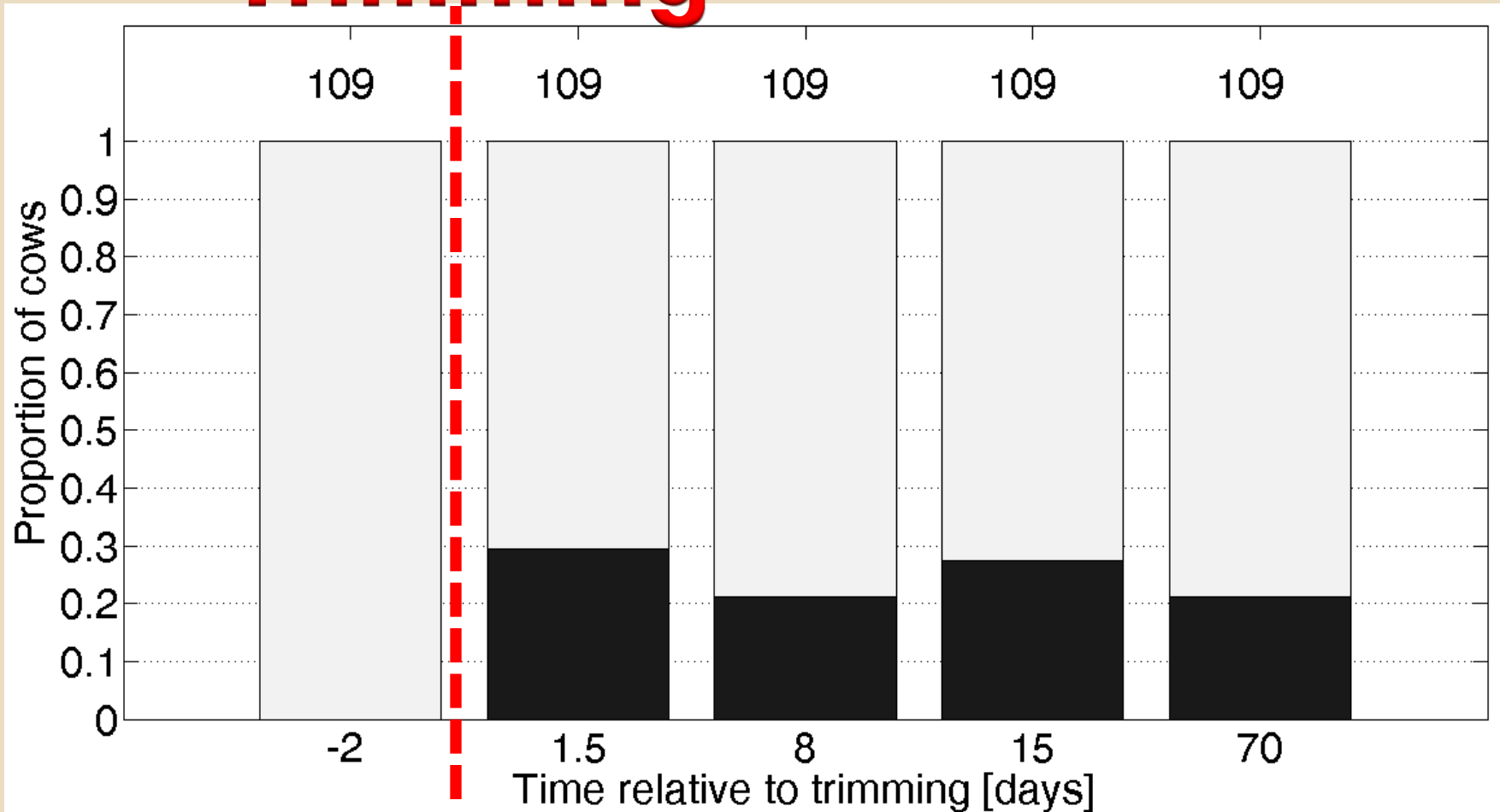


# Non-lame cows



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## Trimming



# Behaviour sensing



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- HR-Tag™
  - Cow identification
  - Ruminating time [min/2h]
  - Activity [activity index/2h]
  - heat detection
  
- Free Flow™
  - Milk yield



# Neck activity response to trimming

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Variable	F-stat	df1	df2	P-value
Trimming	4.821	1	527	0.029
Parity	6.664	3	527	<0.001
Lesion	5.672	1	527	0.018
Milk	4.335	1	527	0.038
Locomotion Score	26.412	1	527	<0.001
Milk*Trimming	6.368	1	527	0.012

Before 0 1 2 3 4 5 6 7 8  
Time relative to trimming [days]

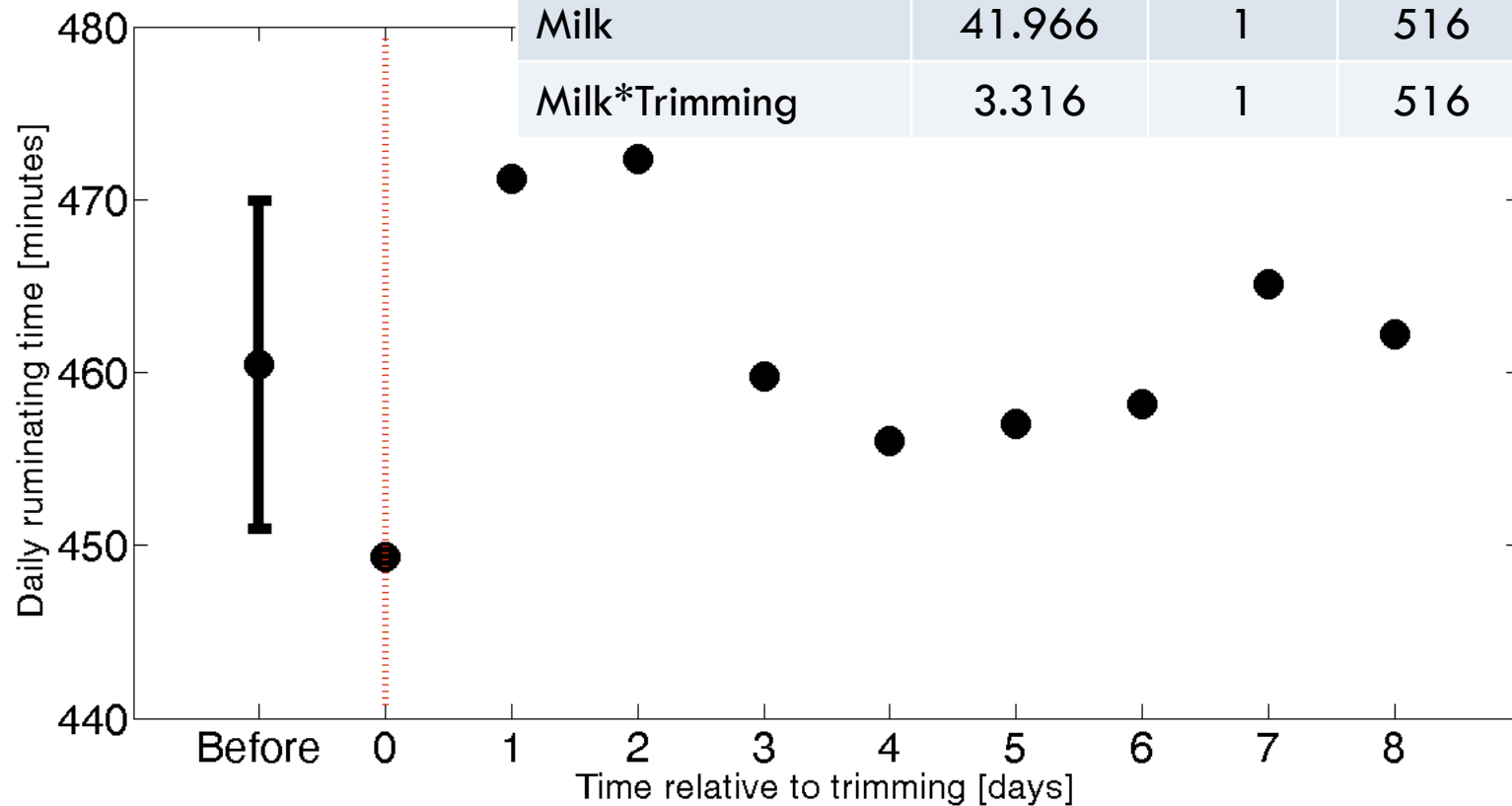


# Rumination response to trimming



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Variable	F-stat	df1	df2	P-value
Trimming	0.011	1	516	0.917
Trimming*Parity	7.049	3	516	<0.001
Milk	41.966	1	516	<0.001
Milk*Trimming	3.316	1	516	0.069



# Milk yield response to trimming



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Variable	F-stat	df1	df2	P-value
Trimming	0.604	1	516	0.437
Parity	3.566	3	516	0.014
Lactation stage	37.156	3	516	<0.001
Parity*lactation stage	2.455	9	516	0.010
Lactation stage*trimming	4.183	3	516	0.006
Activity	4.985	1	516	0.026
Ruminating time	64.952	1	516	<0.001

# Discussion



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- **No differentiation between lesions/disorders**
- **Day of trimming → cows out of routine**
- **Unknown onset of disorder**
- **Pre-winter hoof trimming → wet environment**
- **Preventive hoof trimming ≠ Treatment trimming**
- **Single farm data**

# Conclusion



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- **Most disorders in hind hoofs**
- **After two months, herd level not recovered**
- **Hoof trimming affects cow behaviour and performance**
- **Activity directly affected**
- **Effects ~ parity, lactation stage & lesion presence**

□ **More questions?**

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**Thank  
you!**